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THE AMERICAN GAS LIGHT JOURNAL

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BRIEFLY TOLD.

THE PROPOSED AMENDMENTS TO THE GOVERNING RULES OF THE PACIFIC COAST GAS ASSOCIATION.—The members of the Pacific Coast Gas Association have much reason to be pleased over the measure of success that has attended their concerted action in forming and sustaining an Association that would be of benefit to the industry in which they are so actively engaged. The last convention, although it marked but the fifth year of the Association's life, proved conclusively that the gas field on the Coast was large enough and important enough to warrant its gas makers and gas sellers in the belief that the tilling which had yielded such satisfactory garnering could be trusted to return even better produce in the future. That knowledge must be especially welcomed by those who, founding the Association to the accompaniment of many sneers that failure would be its ultimate portion, kept on in the course mapped out, indifferent to the forebodings of the doubtful and neglectful of the disparagements emitted by those opposed. However, practical or fanciful deductions to the contrary, our knowledge of the situation is that the Pacific Coast Gas Association has been and is a successful body, and knowing that success is its portion, on the lines of its original governing rules, we regret the feeling of unrest shown by Mr. Crockett and his party at the last meeting through the proposition to change the latitude of the Association's purpose and object by the submission of an amendment to the Constitution which would open its membership rolls to the admission thereon of the name of any or every electrical peddler on the Coast. None know better than we the solid support afforded the Coast Gas Association (at the time that such support was absolutely necessary to the existence of the Association) by Mr. Crockett and the San Francisco Gas Light Company, and we are quite well aware of the business circumstances which, within a comparatively short space of time, have ended in the formation of the San Francisco Gas and Electric Company. But as the necessity that makes success in one place is not always the requisite to advance in another place, even if the first be a much larger place than the second one, we beg to submit that the peculiar conditions named by Mr. Crockett for admitting to membership in the Pacific Coast Gas Association every electrician, be he bellhanger or otherwise, on the Coast, are insufficient. If the President of the San Francisco Gas and Electric Company—and the fact that he is First Vice-President of the American Gas Light Association as well is quite in our minds—had seen fit to suggest that his amendment, now reading, "To be eligible as a member, a person must be an active officer or employee of a gas *or* electric company, or a person whose pursuits constitute a branch of gas *or* electric engineering," should read, "To be eligible as a member, a person must be an active officer or employee of a gas *and* electric company," etc., there might not be much room for discussion over the amendment. For, as in the case of the artificial lighting from central stations of San Francisco, it is shown that sometimes gas and electricity may be in harmony when harnessed to the same coach. We contend, however, that unless such harnessing exists it is very much safer for the gas industry to haul its own burden. To put the matter bluntly, we believe it would be vastly better for the gas interests of the Coast were the Pacific Coast Gas Association to keep along over the lines that have heretofore kept

the interest of the Association and the industry quite well in the middle of the road.

Gas Burners vs. Incandescent Electric Lamps for Street Illumination.—Our current item columns contain some mention of what the residents of the Eckington suburb of Washington, D. C., desire in betterment of the public lighting of that place. Heretofore Eckington, as to its streets, has been illuminated by means of incandescent electric lamps, the lighting service from which has been so totally inadequate, despite the expense thereof, that the people sought deliverance therefrom. The pipes of the Washington Gas Light Company had not been put through the Eckington district, but as soon as the Company determined to pipe the place, just so soon did the residents demand that the gas lamps be substituted for the incandescent electric burners. To be sure, the instance is but a very small illustration of the substitution of that which is serviceable for that which has been found unsatisfactory; nevertheless, it is quite an up-to-date example of the fact that incandescence electric lamps are worthless as agents for the illumination of outdoor spaces or places.

Notes.—Secretary W. A. Aldrich, of the Spokane Falls (Wash.) Gas Light Company, intimates that when the plant improvement at that point is completed (which it is thought will be finished before the end of the year) the selling rate will be reduced to $1.50 per 1,000.——Mr. F. W. Jackson, the clever Secretary of the San Diego (Cal.) Gas and Electric Light Company, was united in marriage to Miss May Bleecker, August 25th.——Mr. Ebenezer Crawford, prominently identified for years with the natural gas supply of Venango county, died at his home in Emlenton, Pa., on the afternoon of Wednesday, August 25th. He was in his 76th year.

How to Make a Dark Room Lamp.

Photographic News suggests that a "dark room" lamp can be thus produced:

Make a box of ½ inch wood of sufficient size to accommodate a paraffine lamp which you may have, and have about 1 inch all round or more to spare. Fix a ledge all round the inside of the box half an inch high and half an inch down the box from the open end. Then fit a frame on hinges to one side of the box, and so made that, when shut, it closes up tight against the ledge, and its upper surface is flush with the edges of the box. Then on the opposite side of the box attach another similar frame, hinged to the edge of the box; so that when the first frame is shut down the other frame can be shut over it, fitting flat on the edges of the box. The frames are to be made of ½-inch wood and about 1 inch wide, each side. Then fasten buttons on the box to fasten each frame when shut down.

In the top of the box cut a small hole, and arrange a piece of tin over it, so as to let air out, but not light. Similarly with about six small ½-inch holes in a row at the back of box, along the bottom. This is all the ventilation required. A small hole, say 3 inches by 2 inches, at one side is useful, if glazed with ruby glass, both to see how the lamp is going on and to shed a side light over your table, so that you can see where your dishes, etc., are. All you have now to do is to paste one thickness of canary fabric over the first (inner) frame and two thicknesses of ruby fabric over the outer frame. This will give a perfectly safe light for isochromatic plates when both frames are shut, and if you open the outer frame you have a yellow light that is delightful for bromide paper work. Of course, the thicknesses of the fabrics depend on the brightness of the lamp, but the above are safe with a 4-candle power lamp.

A shade is a very desirable and yet easily made addition. Make one of tin, fastened with a pin at each side and a side stay, so that you can fix it in any position you like, say very far down at the commencement of developing, and move it higher and higher as it goes on. The shade also acts as a protection to the front of the lamp, if it is put away with the shade shut right down. It is also a good plan to wax the fabrics before pasting them on. It secures them from splashes of developer, etc. With a simple arrangement of a projecting pin you can regulate the wick from the outside. For white light, to print bromides or other things, you simply open both doors, and take lamp out if you wish through the front.

You can put a reflector in by getting a piece of sheet tin and cleaning it well; bend it in a semicircle, push it through the front of lamp, and let it go, when it will spring out and fit tightly inside the box. A couple of screws through the back of the box makes this a firmer job, and you will have to cut a hole in the tin if you have a side light as suggested above.

[Official Report.—Revised by the Secretary.—Continued from Page 331.]

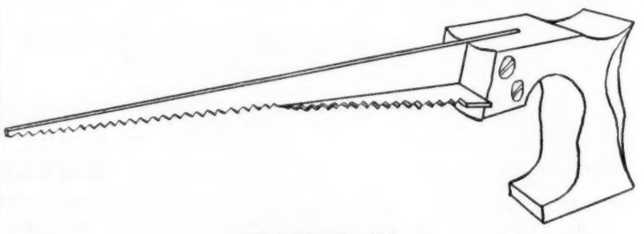
FIFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

Held at San Francisco, Cal., July 20, 21 and 22, 1897.

Second Day, Morning Session, July 21.

The Wrinkle Department.—Continued from Page 331.

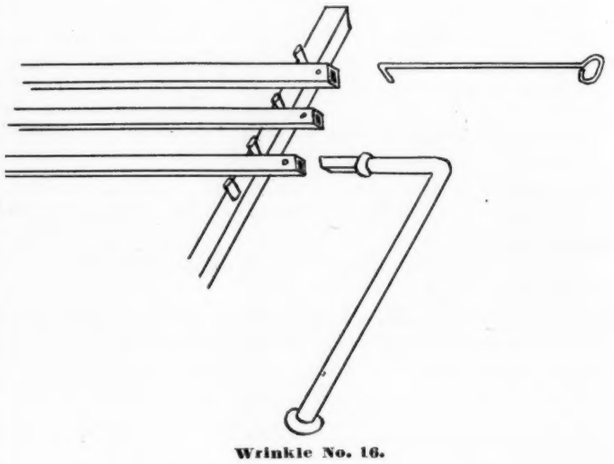
Wrinkle No. 15 shows a compass saw, bent at right angles lengthwise



Wrinkle No. 15.

of the blade from center to heel, and will cut a square corner without the aid of other tools.

Wrinkle No. 16 is for the benefit of the stoker; the grate bars have square holes in outer ends to allow the inserting of a right angle lever. The leverage thus gained will allow the operator to move the



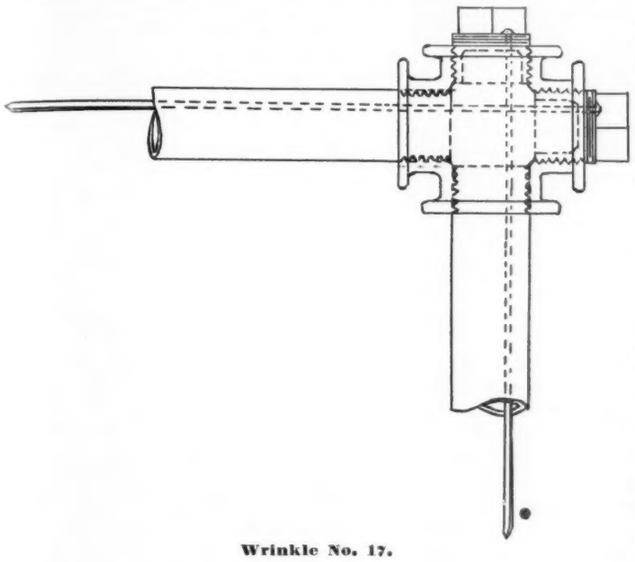
Wrinkle No. 16.

bars in any direction in shaking the fire, and he is far enough away to escape the steam rising from the ash pan. A hole is also bored in the side of the bars for inserting a hook to draw the bars when one wishes to drop the fire.

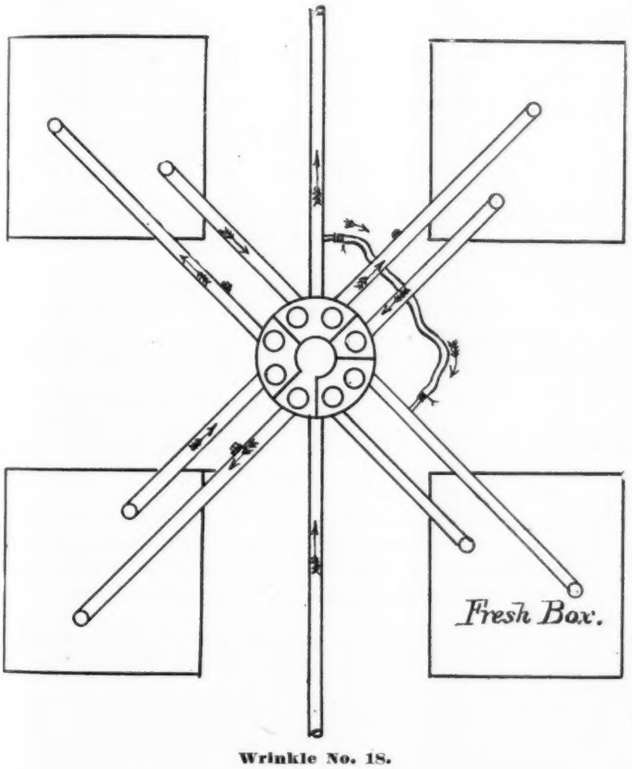
Wrinkle No. 17 presents a good idea for cleaning drips. A T or cross-fitting is put at the angle of the drip, the plugged ends having a strap of steel fastened to the plugs, the strap being inside and against the side of the pipe. Turn the plug, and the strap at once frees the pipe from any obstruction.

Wrinkle No. 18 supplies a method to remove the air from purifying boxes before turning on the box. In the outlet pipe of center seal tap a 1-inch hole; put in cock and hose nipple, and in each inlet pipe to box tap and put in the same. Before changing, connect with 1-inch hose the outlet pipe containing purified gas, and the inlet pipe of the box which you are to put in use. Remove the cap on the cover of the box and allow the gas to blow through the material. It will take 10 minutes or more, depending upon the size of the box. Then close cap, shut off cock and turn on the box. The above Wrinkle is furnished by a gentleman not connected with our Association and is a valuable idea to those of us who, making straight coal gas, are, as a rule, making the maximum candle power and can ill afford the admission of any air.

Wrinkle No. 19 is from Mr. J. Bryant Grimwood, of San Francisco, and furnishes a practical suggestion for the laboratory. He says that

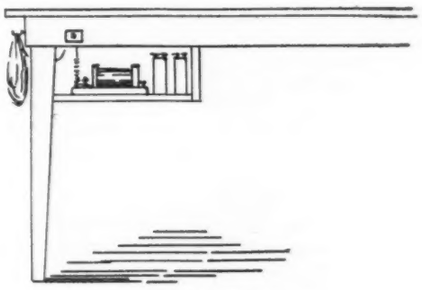


Wrinkle No. 17.



Wrinkle No. 18.

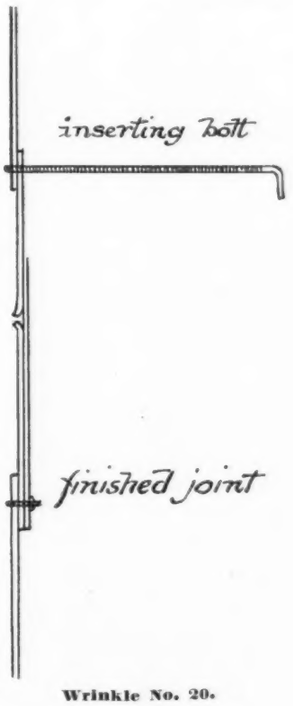
until recently his sparking apparatus for gas analytical purposes consisted of a small induction coil placed at the back of his table, and excited by a plunge battery of the Grenet type. The lead-wires from the coil always remained attached to their respective binding posts, and when not in use the loose ends were hung over a hook placed in a shelf above. This seemed a good arrangement, for as the battery and coil were out of the way the table was clear for the remaining apparatus. He found, however, when he was ready to ignite the gas in his pipette it was not always easy to lean over the table, loosen the binding screw on the rod, hold the zinc plate and dip it without knocking over pipettes or breaking articles which happened to be placed on the table during his work. Care also had to be exercised in handling the two lead-wires. He concluded to abandon this arrangement and now manages in the following way, which is infinitely better. For the Grenet cell he has substituted two small dry cells for open circuit work, which are inexpensive and will last a long time, with the further advantage that they can be placed on their sides or in whatever position seems best. These cells are fitted into a box beneath the coil, the connections made, and the box screwed beneath the corner of the table, out of the way and out of sight. He uses a heavy insulated duplex wire, as small as possible, to avoid extra weight for the secondary of his coil, and this is carried along one end of the table and attached to a hook when not in use.



Wrinkle No. 19.

Another duplex insulated wire leads from the battery, along the under side of the table, to a convenient point where a push button affords means of closing the circuit when desired.

Wrinkle No. 20, from Mr. A. J. Vanderwhite, of San Francisco, shows how easy it is to put patches on a holder when the same is in use. All the work is done from a staging hung from the crown of the holder,



Wrinkle No. 20.

thus avoiding the difficulties arising from variations in the height of the holder. Beginning at a convenient point on the sheet to be patched a rivet head is cut off and the rivet driven out. The hole is then reamed smooth and clean and tapped. Owing to the double thickness of metal where the sheets lap it is possible to cut a thread long enough to give a hold, it being doubtful whether this is possible on a single thickness when the metal is not greater than No. 14 iron. A suitable distance into this hole is screwed a rod several feet long, with a continuous thread, and bent at right angles about 6 inches from the end. This bend serves the purpose of a handle and makes it possible to insert the rod without the use of a wrench or other tool. Having been firmly screwed in place, it is cut off about $\frac{1}{8}$ of an inch from the sheet, leaving a sort of stud bolt with a continuous thread. The next rivet is dealt with in the same manner, and so on around the whole sheet each time inserting the threaded rod and cutting it off at the proper length. It is now a simple matter to take a new sheet, punch holes to fit over the improvised stud bolts, make a red lead putty joint and draw the new sheet up tight, with nuts on the outside. The nuts cannot be distin-

guished from the rivet heads at a little distance, and consequently the patch is not noticeable.

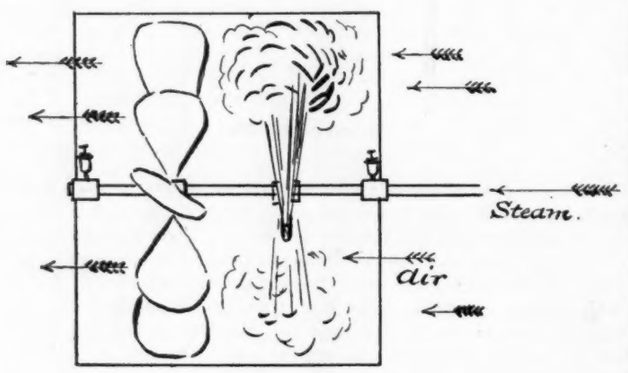
In conclusion, I wish to draw your attention to cards shown in *Wrinkle No.* 21. They were furnished by our Secretary, Mr. John A. Britton, hoping they might suggest a Wrinkle. Each one is a Wrinkle in itself, and suggested to me the value of such a collection, but the work of collecting and compiling the same would involve so much time that I could not undertake it, the time being limited. If all the forms, together with a sample leaf of all books used in office and other departments of the companies represented in the membership of our Association could be collected, properly compiled and called "The Association Scrap Book," its value could hardly be estimated. Are we all satisfied with the form now used in our gas registers? If not, how easy it would be to arrange a satisfactory one if such a collection as proposed was at hand. In this Wrinkle notices Nos. 1 and 2 give the consumer information that is necessary for him to know, makes the second visit of your meter setter unnecessary, and secures your company against any possible loss arising from inexperienced people turning on the meter. Who will say it is not a good thing? There are many others; all we have to do is to collect them. I would suggest that my successor take up this work the coming year, and, if thoroughly done, will be an encyclopædia of information for the members of this Association. If the Wrinkles presented to you this year prove of any value to the members, it would no doubt be of interest to the Association if the same be made known at our next meeting, noting any alterations or improvements, so that in time what are now Wrinkles will become standard apparatus used in our business.

Discussion.

The President—You have heard the "Wrinkles," as read by Secretary Britton for Editor Osborn. What is your wish respecting them?

The Secretary—With reference to the Wrinkles contributed by me, let me say I have added to them, and they are all contained in the scrap book there on the desk. They contain nearly all the forms which are used in our business. I made that initial move at Mr. Osborn's suggestion. They may prove of value to some of you. Mr. Howard, under the head of Wrinkles, would like the privilege of explaining a steam jet apparatus which he has used in connection with the burning of Welsh anthracite coal.

Mr. Howard—This explanation, gentlemen, is not in the nature of an advertisement. Happening to have some inquiries from Eastern gas men, I thought perhaps the outcome might have some value to you. You probably remember in the last two years I had the honor to read before you papers on the subject of anthracite coal, and in those I mentioned the devices we resorted to for the purpose of obtaining proper combustion. Having found it impossible, excepting under very favoring conditions, to use anthracite coal as fuel with natural draught, we resorted to the common method of using a fan blower with an engine driver, and an air pipe to convey the air into the ashpit underneath the grate bars. After considerable experience in that line, we found the



Wrinkle No. 22.

expense of installation was sufficient to deter quite a number of people who wished to use Welsh anthracite coal as a smokeless and economical fuel. Last year I described a steam jet which we had substituted on the score of economy. The use of the steam jet required that the steam should be superheated before it was passed through the jet into the ashpit, and the inflow of this attenuated steam carried with it a quantity of air necessary for the purpose. Not being entirely satisfied with that, we determined to get up a a combination less expensive in the use of steam. The outgrowth of our thought upon the subject was that we have found it possible to utilize the principle of the lawn sprinkler, which you have seen revolving through pressure of water trying to get out of the bent arms. We devised an apparatus that consists practically of a lawn sprinkler and a suction fan. The plan of it is that simply a steam pipe, without superheating the steam at all, is attached to this shaft. When the steam is admitted it can only escape through these bent pipes, and the attempt of the steam to escape through these bent pipes will give us a number of revolutions equal to 2,500 or 3,000, according to the pressure, and with the revolution of the arms themselves comes the revolution of the suction fan. All that is necessary to do with this is to knock a hole in the side of the boiler, and below the line of the grate bars insert this cylinder. Make a little steam pipe connection, and put it into this. I thought it well to bring it to the attention of those of you for whom it might have interest, because some of the Eastern gas people have been recently writing to us to get a description of the machine. This is the culmination of all our experimental work. We can get 3,000 revolutions at that point, getting a pressure equal to an ounce of air. The air goes into the ashpit saturated with steam, which, of course, is discharged as it escapes from the axles of the bent arms. The saturated air we find to be 5 per cent. better than dry, cold air in promoting the evaporation. The theory of it is, when the vapor strikes the bed of the coal, that is either entirely or partly incandescent, from such association of the oxygen and hydrogen, the oxygen goes over to the carbon and forms carbonic oxide gas which burns with a low, blue flame, and the hydrogen, being free, burns with a long, yellow flame. We noticed, in using the dry, cold air, that we did not have a long, yellow flame, and to some extent we were dependent upon the heat-giving power of the gases as they passed through the tubes of the boilers. But we have measured the flame made with the saturated air, and found we got 30 feet in length; so, instead of having hot gas passing through the tubes and generating steam in the water, we got the increased efficiency of the flame itself.

Mr. Gregory—And when the hydrogen gas vapor going in strikes the bed of the fuel I suppose it expands without any gas, and by that means adds to the draught.

Mr. Howard—We think we get the free hydrogen gas burnt by itself, and that is the theory for the long flame that we get, because with cold, dry air we did not get it.

Mr. Clements—That is somewhat different from what you had at Napa last year.

Mr. Howard—The other was simply a steam jet about 10 inches long inserted in the mouth of the cylinder, like this, and we depended entirely upon the steam to draw in air, by its combination of the steam, air and the jet itself, and it is very much less expensive than a fan blower.

Mr. Holberton—What was the amount of steam required?

Mr. Howard—As compared with the steam jet we would get along with about one-third, because we have only three openings here, and they are very much smaller than in the steam jet that I described at the last meeting.

The President—That is a very interesting addition to the process of combustion under boilers. What is supposed to be the price that that can be furnished at?

Mr. Howard—We are not ourselves interested in the device. We did not get it up ourselves, but part of our office force is interested in it. I don't recollect just what they are charging. It is not very much. They have been introducing them, but we are not interested in the device itself.

The President—Approximately, what would they be worth?

Mr. Howard—I think they are charging approximately something like $25 or $30 for them.

Mr. Clements—Under the head of Wrinkles I want to say, on behalf of Editor Osborn, that he has performed a very noble work this year in the presentation of this budget. None know, perhaps, better than yourselves the labor connected with the accumulation of such work. The amount of correspondence between the head of the Wrinkle Department and the individual members to secure any sort of a showing, cannot be estimated by one who has not been engaged in that particular branch of the work, and I want most earnestly and sincerely to have this Association thank Mr. Osborn for his efforts, and to show their full appreciation of his work.

On motion, Mr. Osborn was then tendered a vote of thanks.

Mr. Converse—I don't know whether this matter would come under the head of Wrinkles, but during the discussion this morning under the head of card bookkeeping, it occurred to me that we have a form, which I think is original with our Company, used in connection with

the numbering of our valves. All of the valves throughout the works are numbered, and we have a book for the stub and card which is torn off. Whenever a valve is closed or opened an order is issued to the party who is to do that work, and quite recently we had occasion, in making some connections, to close 18 valves. This system was a comfort to the man in charge of the works, through knowing that there could be no possible mistake by issuing these little orders to the different men about the works, and the order must be returned to him before the valves were opened again, or closed. He knew there could then be no possible mistake. I thought I would hand this thing in among the other cards which Mr. Britton had for the inspection of the members that they might know the convenience of it. It is original with our Company; and I don't know of any other Company that has this system of numbering the valves. Our valves are numbered from the outlet to the hydraulic main to the outlet into the street.

Mr. Jones—It may seem to some of the members that the system of numbering the valves and issuing an order when a valve is to be opened or closed would only apply to the larger companies; but I think it could be applied to even the smallest company. A superintendent of a works, in making any changes which required the entire stoppage of the works, or even in taking out one portion of his plant, requires to close a great many valves. There is always a regular sequence in which those valves should be closed and opened, in order to avoid stopping your works with a valve closed, or finding when you make a break that there is a valve open. I find it convenient, when you are going to make these changes, to think it over beforehand, making a list of the valves, and making an order upon yourself which valve you shall have closed, and which opened, and have them in proper sequence. In very large works it is convenient to number the valves in series. For instance, retort house valves from 1 to 19. Even if you have only two valves in the retort house, they would be 1 and 2. In the next room, say the exhauster room, number them from 20 to 29. So in passing through the works by looking at your order you know exactly in which room the valve is located. No. 65 would be in the purifying house, in a 6-room gas works, for instance.

The President—It avoids also unnecessary descriptions of valves. Valves are indicated by numbers, and the party can be told to shut off No. 5, or, as Mr. Jones suggests, in a series of 20, 30 or 40, as high as the case may be.

Mr. Jones—You will readily understand it is of vital importance in shutting off a piece of apparatus to open the bye-pass valve before closing either the inlet or outlet, and by the use of this system an accident becomes impossible.

On motion a recess was ordered, the Association to reconvene at 1:30 P.M.

SECOND DAY—AFTERNOON SESSION.

On reassembling, the President announced that the first business in order would be the recital of the results secured by Mr. John Clements, of Red Bluff, Cal., in connection with his management of

THE EXPERIENCE DEPARTMENT.

Mr. Clements prefaced his "experience" narration by remarking: My paper will be somewhat of a contradiction of the results of this meeting, inasmuch as I have not received as Editor of the Experience Department a great deal of information from members of the Association. At the same time many of the members have presented papers before the Association that have been truly instructive and enlightening, and have brought out many subjects which I desired to have brought out through the medium of the Experience Department. Therefore I say although some of the remarks made in my paper may appear somewhat contradictory, nevertheless it was prepared in good faith.

At our last regular (the Fourth Annual) meeting you saw proper to appoint me to take charge of the "Department of Experiences," and while I thank you for this manifestation of your friendliness for me, I am at this time sorely afraid that I shall not interest you to the extent that you anticipated when you made the appointment.

This will be largely due to my personal inability and to some extent, I am sorry to say, to the apparent lack of interest on the part of members. I say apparent lack of interest, because it has appeared so to me in my efforts to obtain sufficient data to make up a paper that would interest you; but some wise one has said that things are not always what they seem to be, and I feel that this must certainly be the case with members of the P. C. G. A., and would rather attribute it to their native modesty and retiring dispositions and to the opinion that prevails among craftsmen in general that what one knows, in a general way, all know. Such, however, is not the case.

The daily practice of one plant in any special line of business is not identical with all in the same line, hence the experience of one gas manager is not that of another; the conditions at Portland, Oregon, no doubt, differ widely from those at San Diego, Cal., hence the experiences of the managers differ, and if they could be given in detail or even in a condensed form they would make very interesting reading and be of special value to the members of the Association.

In February last I sent to each and every member a circular letter asking for contributions to the Experience Department.

I will now take up the questions as they were propounded and give you the results as they have come to me.

I have deemed best not to give names and locations from which I have received replies.

The first item is coal.

Please give me your experience with various kinds of coal, both for fuel and gas making?

The first one to answer my question and give opinion on coal says: "In the manufacture of coal gas we have used Wallsend, Japanese, and South Prairie coal from Puget Sound. The use of Japanese coal was abandoned because of the large quantity of sulphur it contained, which made it difficult to purify; it was rich in volatile matter and would yield 1½ to 2 candles better gas for the same amount than other coals. Wallsend, Greta and other Australian coals are about equal in yield of candle power. Wallsend, however, makes an infinitely better coke, the coke being richer in carbon, lasting longer and breaking up less easily than most other cokes. South Prairie, being friable, does not make a good coke except when mixed with other coals. I have not used Hetton coal. For fuel purposes I have used very extensively South Prairie coal, finding it all round a cheaper and better coal than any other on this market, having done as well as $10\frac{1}{6}$ pounds of water evaporated to the pound of coal by the aid of a fuel economizer. I can with South Prairie coal heat feed water from 20 to 25° higher than with any other coal which we have tried, the flue gases running from 75 to 125° higher in temperature."

Another member writes: "Have used Greta coal with good results, making 4.97 feet of gas per pound of coal."

Another: "Have used several kinds of coal in a service of 7 years on the Pacific Coast and find the Australian coals much the best, all things considered. For the past year have used the Hetton coal and it has given good candle power and plenty of coke of good quality. It requires a little closer attention at the purifiers than some coal we have used, but on the whole it has proven quite satisfactory."

Another member answers the coal question by saying he had used Wallsend coal; have also used Hetton coal, both proving good. No other comment.

The next item is on the subject of the various kinds of benches used by the members in their daily practice of gas making. Speaking of benches, I am inclined to think that many of the managers have soft cushions on their benches and are loth to get off of them to give us an item.

However, I have some experiences in this line. The first one is with regenerative and recuperative firing. And this member has given a very thorough account of his experience in this line; he says: "Feeling disposed to examine into the principle of regenerative and recuperative firing, I read what literature I could find on the subject, made some inquiries and observations, and finally concluded to make the experiment for myself. I was a little afraid of purchasing a setting from anyone of the many advertisers, as I had witnessed a signal failure in two cases after six months' trial.

"Having a sufficient number of blocks, bricks and tiles on hand, I ordered retorts and set to work. We cleaned out the arch and cut through the bed into the lower or foundation arches, thus securing a space measuring 13 feet from the crown of arch to base of ashpan, 8 feet 9 inches wide and 9 feet deep.

"Setting ashpan on the bottom we filled as high as its top with concrete for a foundation. There was three feet clear inside of wall back of ashpan. Here we formed a hot air chamber running across the bench and connected with the primary air flues, which, by the way, were of terra cotta pipes, filled around to prevent leakage into chimney flue which was directly above them; there were four runs or 32 feet of chimney flue on each side before entering base of chimneys; the secondary air was taken in on a line with the third run of chimney flue next to skeleton wall; there were four runs and eight posts on each side of furnace, with no intercepting or deflecting arch tile. Everything being in readiness we started the fire in the usual manner of seasoning an open setting. After three days of slow firing, doors were closed, temperature allowed to increase slowly until a fair heat was attained, when steam was turned on underneath the bars, the nostrils or sight

holes were removed for the purpose of giving the carbonic oxide or producer gas a chance to ignite without causing explosion or pop in the body of the bench; the secondary flues were slowly opened, the plugs luted and replaced, chimney dampers opened and the effect of the new, to us, style of firing observed.

"The next question then was to get the proper combination or proportion of primary and secondary air, and, reasoning by previous experiences in manipulating the open setting we were afraid of the secondaries admitting too much air above the fuel, as they have a free and unobstructed pull to the chimneys, reducing the pull on the primaries through the fuel and cooling the bench.

"Such was our reasoning. We continued working the slides at intervals of four or five hours, noting the change, until we had the coke on its surface assume a snowy whiteness, the primaries opened to equal 9 square inches, the secondaries equaling 6 square inches, when we thought the regeneration was on. The heat in the retorts we sensibly increased, especially the upper one (being a bench of 5's), the two lower ones less than the ones above them, all being much hotter in the rear half, with almost a white heat up the rear wall. We noticed the most of the pull through the ports was through those nearest the rear of the bench. Why this is so I have not yet discovered. The air, of course, having to pass by the first four parts to reach those in the rear, with the chimney's first downtake being at the front wall. We tried a steam blower in the primary which had the effect of increasing the heat but not overcoming the defect; consequently we discontinued the use of the steam.

"We continued to work the bench, regretting that we had not arranged a sliding tile in the flues back of the air ports that we might have been enabled to experiment as to the proper part of the furnace to admit air.

"The consumption of coke was reduced to one-fourth the make of the bench, the retorts taking a charge each of 280 pounds, which gave an average yield of 11,000 cubic feet of gas to the ton of coal, or a fraction short of 5 feet to the pound.

"We clinkered once in three days, and this bench was in continual use for three years; in the last year of its service we were obliged to rebuild a portion of the wall at rear of the furnace while at a working heat, as the wall had melted down.

"During this experience we had been trying to inform ourselves on the subject of this character of benches, and finally made up our minds to try a setting recommended by A. C. Wood of Syracuse, New York. One feature of this bench consisted in building in the end of the furnace wall a cast iron water back, with a capacity of 10 to 15 gallons of water with an overflow pipe, a feed pipe and a blow off to clean out any sediment that might accumulate.

"The drip from the overflow keeping the ash pan supplied with water and supplying sufficient steam for the proper working of the furnace.

"The chimney flues were made extra large, being 12 by 14 inches. Furnace 20 inches wide and 6 feet deep from the post holes and built in the center; that is, center of furnace, was the center of the base between walls of the skeleton. This was done to overcome any effect of intense heat on end walls.

"Arch tile 2 feet long spanned the furnace below the lines of posts, front and rear, near the walls, and one tile in center between the two as mentioned. There were six post holes on either side, 1½ by 3 inches.

"Retorts well braced, and four down takes into the first and largest horizontal flue under the retorts.

"The down takes were built from the top of the upper side retorts making the setting very solid. The front wall was built up within an inch of the lintel and left free for vent and expansion. Sight holes were furnished with small castings, 1½ inches by 3 inches, with slides 6 inches long, having a mica window as large as a half dollar to slide into position to enable one to observe the operation and effect without altering the conditions of heat or air, which was the case with the first bench mentioned.

"The space above the wall and the firing door gave ample venting surface to ignite the gaseous fire. The heating was very rapid and indeed it was astonishing, in fact it seemed wonderful, that so much heat could be produced with so little draft admitted under the bars.

"On the fourth day after firing, the retorts were charged each with 280 pounds of coal, and were successfully worked off in three hours. We then increased the charges at each round until each retort took a charge of 448 pounds of coal, or a ton of coal to the five retorts. These were repeated every four hours.

"The manipulation of the primary and secondary dampers proved the bench to be as susceptible to change as a Welsbach burner is to the opening or closing of the shutter. A movement of ¼ of an inch on the primaries, ½ of an inch on the secondary would make a marked change in the appearance of the furnace.

"The primary slides open ½ by 4 inches, the secondary 2 by 4 inches. When firing with coke or coal open the primary ¼ of an inch, and close the secondary ½ inch for the first 20 minutes, and set them as formerly.

"We renewed fires once in four hours, using the coke produce from one long ton of coal in a 24 hour run, and leaving the coke produced from the remaining 4 tons of coal carbonized to be disposed of to the credit of the residual account.

"Clinkering was reduced to simply shaking the bars, excepting once a week to remove some balls formed and knocked down when cleaning from above. The bench was a curiosity as well as a success.

"My stoker at one time astonished me by calling my attention to red hot mouthpieces. He had been doing a little experimenting on his own account.

"I am of the opinion that any heat desired (or for that matter undesired) can be generated in this style of bench with a minimum of fuel, even to the destruction of the retorts or the bench itself; and yet it can be manipulated, as I have said before, as easily as a Welsbach lamp.

"The natural result from the excessive heats produced by the stoker was stopped standpipes; especially with some kinds of coal. The yield was less, candle power was lower; none of this was the fault of the bench, for when properly handled no better results can be obtained from any style of firing known to us.

"As an experience, a regenerative and recuperating setting where coal gas is to be made will give the best results as to coke saved, yield of cubic feet of gas per pound of coal, ease of working over any previous method of heating for the distillation of coal, at the same time presenting a practical demonstration of complete combustion in the furnace, instead of finishing it at the chimney top as in days of yore."

The next member has to say that "we have never used regenerative benches, we use open settings of clay retorts in benches of 5's, carbonizing 1,200 pounds of coal daily to each mouthpiece; the average life of retorts, which are the 'Weber' make, being full 3½ years."

Another member answers questions direct and says: "They use open settings and have used both clay and iron retorts, preferring the clays."

Still another member says: "We have used both clay and iron retorts. As our works are very small and we have plenty of time to make all the gas we need, we rather like the iron retorts, as we have to let our heats up and down and have banked fires fully one-third of the time."

This concludes what I have gathered on the subject of benches. There might be a great deal said on the subject of benches. There are the church benches, the school benches, the park benches, and—but that is another story and must be told by someone else.

And now we come to the up-to-date subject of water. This very valuable article has been used for many purposes, such as building oceans, rivers and canals; to make steam by which great and ponderous war vessels have been propelled, and great industries set and continued in motion. It has been used by housewives and laundrymen from the Flowery Kingdom, and has even been drunk occasionally by Pacific Coast gas men and others.

It is a subject, as connected with the making of gas, that has within the present decade become, and is now, a very important factor. Much could be said and written, in fact has already been said and written thereof, by wiser ones than he who now writes up your experience department.

I have a few replies to my questions: Have you made water gas on a small scale? Have you made water gas on a large scale? What is your experience with the apparatus you have employed? If you have used more than one kind, which do you consider the best and most economical?

The first one to answer says: "We make carbureted water gas on a large scale, employing the 'Springer' apparatus only. In comparison with other works I know it to be fully as economical as any, and after making an addition of 5 feet to the superheater shells, which was made to one of our sets, we found that it decreased the quantity of oil required per 1,000 feet about ¼ of a gallon without any appreciable disadvantage."

The next one answers by simply saying: "We have installed and are using the 'Improved Lowe,' and consider it very good."

The next one comes in the way of the practical experience of a man who has rustled and tussled with the question and the apparatus in many of its actual dispositions and indispositions. It will take up a little of your time, gentlemen, but it makes quite interesting reading:

"After reading Mr. Charles F. Adams' letter, of Portland, on his

experience with water gas, read before the Pacific Coast Gas Association's Fourth Annual Meeting, at San Francisco, July 22, 1896, I cannot help but sympathize with him, after spending about three years with a similar plant.

"About May, 1892, I answered a call for a gas meter repairer for a town of about 12,000 inhabitants, with about 600 American meters in use. As time passed I drifted into any and everything about the works, and was told to attend to meters when there was nothing else to do.

"The process of making gas was the 'Lowe,' 1874 type, I believe, one of the first outfits of its kind in use on the Coast. The apparatus was used in two different towns before being installed in this place.

"In conversation with a man making gas, I found that he came with the plant and had charge of its erection. As water gas was new to me I was all eyes and ears. I noticed the building was new, with wooden frame and floor, with sheet iron roof and sides. There were four cables running from roof anchored to the ground, I presume to keep the building in place while making a run.

"The clinker doors on the generators were built up 5 feet from ground floors. Coal was raised by steam elevator to second floor. The superheater's cap or lid raised perpendicularly about 3 or 4 inches from its seat. The steam and oil valves and levers were at opposite sides of the building. Oil flowed by its own gravity into the generators from a tank on the roof.

"The boiler, engine and blower were at least 100 feet from the generators. Fuel for the boiler was made from ashes or clinkers from generators mixed with tar, then fired under the boiler, same as coal.

"Engine was a 15-horse power, automatic Westinghouse; the blower a 40-inch Buffalo. A separate 1-horse power upright steam engine in superheater room was used for pumping oil for the tank on the roof.

"The exhauster was a common steam jet inside of a 4-inch pipe used for drawing the gas out of the relief holder into the distributing holder.

"The distributing holder had about three tons of brick on it. Pressure ran from 2½ inches in day to 4 inches at night, regulated by an old style Badlam governor. Photometer was about 2 feet from governor on the town side.

"For purifying, pine shavings and copperas were used, revivifying with steam. In making changes the covers were raised by hydraulic pressure with the aid of a steam pump. Two cylinders hung directly over the center; one over each box. It took two men to raise a cover; one at the pump (50 feet away) and one in purifying room. When the cover was raised one would stand a step ladder alongside and step over on top of the cover (it hanging by four chains, one from each corner brought to the center, hooked on to the piston rod), then hook the chains fast to the cylinder head to take the weight off of the piston rod. Often when getting on or off of the cover he would cause the rod to bend or break something else, hence there was always more or less danger every time the purifiers were changed; the boxes were about 12 by 12 feet.

"The relief holder tank was the tar well and every time the holder went up or down it received a fresh coat of paint. When we sold any tar we pumped it out by steam and replaced it with water. In fact there was enough steam used around the works to lead one to think that it was as much of a steam works as a gas works. Steam was kept up all night in case of fire.

"In the absence of a station meter we took other means of finding out how much gas was made. The following is quoted from memory of August, '93.

Gal. Oil per 1,000.	Pounds coal in Generator.	Candle power.	Make per Run.	Hours Running.
5	400	18 to 28	3,000 cu. ft.	10 and 12

"Output, 500,000 cubic feet summer months, 1,000,000 cubic feet winter months.

"Oil, at 8 cents per gallon; coal, $14 ton with freight; gas, $3 per 1,000. Electric light plant owned by same company.

"The gas maker led us all to believe that as a whole the apparatus was very dangerous, in fact, he had everybody connected with the works afraid of it when running. His particular kind of a heat must be a straw color; steam must be at 80 pounds. Coal, Welsh Anthracite; oil 40° distillate, with a lot of secret rules; any deviations from the same would result very disastrously. There was only one man in a hundred who had brains enough to run a plant like this; besides the work was killing him, it being a continual run from the boiler and engine to the generators. No suggestions or advice were heeded, as the whole thing seemed to be run like, "My grandfather and father had it this way, and it's good enough for my style."

"The candle power would be away up one night and down the next. Meter man was called up by steam whistle most every night to attend to some drip. When we located a drip we extended it to the sidewalk or curb with a cap on top, then we used to take one day in the month and pump all the drips in town; about 100. Tar would drip from burners and keys. To relieve the same, we put drips on the fixtures, which were made of brass balls, such as come on curtain poles, with 1-inch nipple soldered in the top, the nipple screwed into a tee, directly under the burner. Gas being turned off at the key we unscrewed the ball, emptied it and put it back. Consumers soon knew what to do when there was any trouble at the fixtures.

"In a short time the company desired a new gas maker, then they found out that the old gas maker had the job for sale, as he said it was customary for the old man to be paid for information and the trouble of breaking a new man in, so the superintendent allowed the new man to buy his job; in that way he owned it as long as he wanted it. Some of the changes made by the new man saved time and material, such as putting in a sliding pole from the second floor to the first (same as in use by fire departments) to enable him to reach the boiler and engine room in a hurry as was often the case. He put a steam gauge in generator room from the boiler, run a trolley rope from the generator room to the throttle on engine, by-passing the throttle so as not to stop the engine entirely; this was used to slow down the engine while making a run, also to start it again on beginning to blow up. He connected a rope, with the aid of pulleys, to the valve on the exhauster with the top of the relief holder. When the holder went down it would shut the valve off and prevent the exhauster from sucking in holder's top. Under the old way of running the blower, by using two belts brought to a very high tension, a new belt would hardly last one week. One of the belts was discarded with the result that the one in use rode easier; in fact, it lasted nearly six months without being disturbed.

"As water gas was now the thing, and the Company had been to some expense on the new plant, they began to economize by tearing down two benches of five retorts. The hydraulic main, standpipes, mouthpieces and exhauster were broken up for old iron and sold along with the bricks; also two pairs of scales, forge and anvil, wood, etc.—six months afterwards they purchased a new forge.

"Not having a record of the street mains caused us trouble more than once. Very early one morning we were called out, as gas would not burn in one of the hotels, and we looked for other trouble, as the drips had been pumped the day before. Finding water in the service, and not being able to free it, we put the drip pump on and pumped nearly 24 hours. The trouble was two blocks distant; the street was being graded and the men had broken off a 1-inch service with a plow. It rained shortly afterwards, and the service took in a large portion of the water from that block, but nobody ever knew of a gas main or service on that street. This event caused a record book to be started; also a duplicate giving sizes, lengths and drips, as well as a diagram of each block.

"As a rule, most of the mains were less than 2 inch. Upon the introduction of gas stoves, the dead ends of the mains at the outskirts of the town were connected together with 2 inch pipe, which relieved the wants for the time being. Through having a cheap governor a serious accident occurred that nearly cost one man's life. The governor was situated about 6 feet from the distributing holder, in a dug-out 6 feet deep by 6 feet square, with sheet iron roof. The gas maker had to go into the pit every night to change the pressure. The photometer was in same pit about 2 feet from the governor. The man would light the photometer to get his candle power, at same time getting enough light to enable him to change the weights on the governor. He had been doing that every night for about a year; but the last time was once too often. The water must have been low in the seal, and, in changing the weights, the gas bubbled through the water, caught fire from the photometer, burning the man from his head to his waist. The fire department arrived before we were able to shut the gas off, and filled up several blocks of mains, whereupon we had to hunt up another drip of which we had no record.

"Immediately after the accident I had my first personal experience in handling a water gas plant—that is, for more than an hour or two at any one time. With both holders empty and the gas maker in no condition to talk, the superintendent could give very little information, and as the purchasing agent had a habit of changing the kind of oil and coal (no two carloads being alike), and not knowing what the material was going to do, without anything to foretell what sort of gas would be made until it went into the distributing holder, I was not surprised at meeting with a few difficulties, such as making lampblack, drips choked up, candle power down, oil pump losing its suction, nearly melting the hood over the superheater, oil supplies to generator stopped up, clinkers over grate bars, steam down, consumers calling

up, 'What's the matter with my gas?' etc. After a night or two things ran somewhat easier. I agreed with the superintendent when he said that I did not make as good a gas as the sick man. I simply did the best I could, and the experience gained during the time is hard for me to forget. In the foregoing I have mentioned no names or places, for this letter is not intended to be personal in any particular, simply relating some of my observations and experiences from 1892 to 1895."

To the next question, "Have you used fiber pipe, and what is your experience with it?" the only answer I had was this: "We are now laying some fiber mains; will write you more fully in a few days." But, alas! The few days have dragged themselves into months, and nothing turns up from fiber pipe.

The next question is, "Do you use Welsbach burners?"

An idea ran through my head that considerable experience would develop from this question. One member, to whom I wrote specially on this account, replied by saying, "You can put me down for something." Inasmuch as I have never heard from him again, I have done so, and concluded he was "Another;" further that "there are others." I suppose the reason I did not hear from anyone on this subject is because the Welsbach lamps have come into such general use, supplanting almost everything else, that anyone ought to know all about them and not ask such foolish questions.

I am here reminded of a story told me a good many years ago, while engaged in a little fracas called the War of the Rebellion. Some few boys from Illinois and other States were down in Georgia. Being on special guard at the time, we happened to meet with a young Virginian, a minister of the Gospel, who told us he was to preach the next day in a little schoolhouse somewhere in the immediate vicinity, the exact location of which he had not yet learned. He said, however, that he had made just one attempt to find out, but his attempt was a failure, which latter came about in this way. While riding down the road he saw, at a short distance in advance of him, two boys, or rather young men. From them he inquired the location of and the distance to the aforesaid schoolhouse. The only answer he got was this. One of the boys, turning to the other, said: "Jim, look at that darned fool; he doesn't know where the schoolhouse is." So it is, I suppose, with the one in charge of the Experience Department, who wants to know a lot of stuff about the Welsbach lamps after they have been long enough on the market to be known by every schoolboy.

Seriously, I did expect something in this direction; but perhaps you and I will not be wholly disappointed after all, as I find, on looking over my files, a letter from a gentleman to our President in which he promised to give us something on the lines of Welsbach lamps. If he fulfils his promise he will not have to be classed with "Others."

The next question, "Have you handled gas stoves?" received many answers, and I have obtained them mostly from personal conversation with our members. The manner of introducing and placing them being summed up, amounts to about three methods:

1st. Selling the stoves outright; 2nd, renting them at a small monthly rent; 3rd, giving them outright to consumers. In all cases services are run and connections made free of cost to consumer. The ultimate result of all this is an increased consumption and a consequent increased output, and final increased income for the gas companies, which latter, of course, is the prime object of their existence.

The next question was, "Have you tried prepayment meters? What is your experience in this line?"

To this question I received only a single answer, and as this member has a specially improved one for sale, he invites "Old Experience" to call and see it for himself, "admission free."

This concludes the questions asked in my circular letter and the answers to same, so far as they have been received. If they are of interest to the members of the Association I shall feel amply repaid for what little I have done towards entertaining you.

On motion of Mr. Jones, a vote of thanks was passed to Mr. Clements for his clever handling of the Experience Department.

Special Votes of Thanks.

On motion of the Secretary a special vote of thanks was tendered to the San Francisco Gas and Electric Company, for its generousness in affording to the Association the use of its office building as a place of meeting, and for the courteous attention shown by the Company's President (Mr. J. B. Crockett) and its other officers, in welcoming and making pleasant the stay of the Association's members and guests in San Francisco. Votes of thanks were also passed to Mr. S. B. Cushing, President of the Mill Valley and Tamalpais Railroad Company, and to Mr. Jas. B. Stetson, President of the N. P. C. Railroad Company, for their courtesies in connection with the transportation of the Association to Mount Tamalpais and to Mill Valley, on the occasion of the Association's outing trip to the Mount. The Association also voted to thank the American Meter Company and its agents, Messrs. Thos. Day & Co., for their tender of a luncheon to the Association, to be served at the Tavern of Tamalpais, during the visit of the Association to the summit of the mountain.

On motion of the Secretary, the following

Report from the Committee on Standard Dimension of Castings,

was adopted:

"Your Committee appointed to consider the President's address and report on the adoption of a standard of dimensions for castings, and a system of weights and measures, report as follows: The President deserves the thanks of every member of our Association for the able manner in which he has reviewed the gas business of the past year, and we suggest a rising vote of thanks for his interesting and instructive address.

"Your Committee would advise the adoption by the Association of the standard dimensions of castings submitted at our last meeting, and would urge our members to make use of these dimensions as far as possible in all new work and repairs of old work. Most of the foundries on the Coast are provided with patterns conforming to these dimensions. Your Committee would ask for further time for the recommendation of other standards, including weights and measures, meter unions, etc.

"Respectfully submitted, E. C. Jones.
John L. Howard.
C. O. G. Miller."

Publishing the Proceedings in Pamphlet Form.

The Secretary offered the following resolution:

"*Resolved*, That the Secretary and Treasurer be, and he is hereby authorized to have the proceedings of each annual session printed in pamphlet form, provided cost of same does not exceed $350; and that a committee of three be appointed to review and edit said publication."

Mr. Eichbaum—Does the Secretary contemplate having the proceedings printed from the beginning?

The Secretary—Yes, sir. I take it that the members would desire to have the papers printed for reference, also the Wrinkles and Experiences. As much of the discussion is not of importance, owing to the fact that much of it is really duplicated matter, careful editing of the publication, I think, could bring the cost to less than $400.

Mr. Eichbaum—That instruction and latitude would require the appointment of a committee possessed of much discrimination, for that which, owing to its seeming slight importance to them, they might cut out might possibly seem of much moment to others.

After some further discussion, the resolution was adopted, with the further understanding that the number of copies of the proceedings to be printed should be determined by the publishing committee. The President subsequently appointed Messrs. Britton, Jones and Miller as the committee on publication.

Proposing to Amend the Rules of the Association.

The Secretary—Some inconsistencies that exist in the By-Laws I think ought to be corrected so that our work may be uniform and have no questions raised. Article 8 of the By-Laws reads: "The Board of Directors shall meet at least once a year on the day preceding the annual meeting." We have never been able to do that conveniently. It is hard to get the Directors together, and it is unnecessary to have that provision in there. I move to amend Article 8 by striking out the words "On the day," so that it will read: "The Board of Directors will meet once a year preceding the annual meeting." I also move to amend by striking out the words, in lines 7 and 8, "Shall annually elect an Auditing Committee of three from its own members, who—" so it shall read: "The Board shall have power to examine at any time the books and accounts of the Secretary and Treasurer." The Board has never elected an Auditing Committee of three in all the five years, but has simply acted upon it themselves. I think the Auditing Committee is unnecessary, and that the Board should be the Finance Committee.

Mr. Crockett—If I may I will offer an amendment to the Constitution, which I will submit in writing now with a view of having it adopted at the next regular meeting, as the Constitution provides. The amendment I propose to offer now is an amendment to Article 2, where the word "gas" is used, to add "electricity," so that the text shall read as follows:

"Its object shall be the promotion and advancement of knowledge of the gas and electric business, including all matters relating to the con-

struction and management of gas and electric works, and the manufacture, distribution and consumption of gas and electricity. To establish a spirit of fraternity between the members by social intercourse and friendly exchange of information on the subjects of gas and electricity.

"*Article II.* To be eligible as a member, a person must be an active officer or employee of a gas or electric company, or a person whose pursuits constitute a branch of gas or electric engineering. By a three-fourths vote of members present at any meeting, the Association may elect as honorary members any gentlemen whose scientific or practical knowledge in matters relating to the gas or electrical industries, and whose efforts and interests in that behalf shall recommend them to the Association."

The reason I offer the amendment is that more than two-thirds of the members of this Association at the present time are engaged also in the electric lighting business, and I have known a great many people in connection with that industry who have asked to become members of the Association, but under our Constitution could not become members unless they were also engaged in the gas industry. I think we all desire to have as many members of this Association take an active part in it as is possible; accordingly, I offer that as an amendment to be voted on at the next regular meeting.

Mr. Britton—I am heartily in accord with the amendment suggested by Mr. Crockett; but I think it should go a little bit further. Article III., if you take it literally—and you cannot put any other construction upon it, I think, than this—is to the following effect: "To be eligible as a member, a person must be an active officer of a gas company, or a person whose pursuits constitute a branch of gas engineering." As you know, we have in our Association a number of men who are not officers of gas companies, active or otherwise, nor do their pursuits constitute a branch of gas engineering at all, and we have taken them in readily and gladly. I do not think the Constitution should stand that way. If we are taking in members who are not entitled to be taken in under our Constitution, we ought to amend it, and I would suggest this: "To be eligible as a member, a person must be an active officer or employee of a gas or an electric lighting company, or one whose pursuit is connected with supplies furnished to such companies." I know the Eastern Associations make distinctions in that respect, in that they have active and associate members. I do not believe in drawing that line on this Coast, because of our peculiar conditions; but I do think our Constitution should be amended so as to make it as broad as we have made it without the consent of the Constitution.

The President—As this subject concerns us all, I would like to hear a liberal expression on these points. We are governed a great deal by the actions of other Associations of this character, and I do not believe this course has been adopted as a general thing. All our Gas Associations remain, I believe, distinct Gas Associations.

Mr. Crockett—That may be true, Mr. President, in one way, but our situation on the Pacific Coast is rather a peculiar one. We are very remote from all other sections of the country, and our Association has naturally had to go into both gas and electric lighting. I think, were you to canvass the members present here to-day, you would find that the majority of them were engaged in both branches of the lighting business, and as this Association was started originally for the purpose of informing the members and giving them instruction in the proper handling of their business, it seems to me that this being a branch of the business, we should give those people also an opportunity of acquiring the ideas of others. For that reason I offered the amendment. I believe the electric people here at the present time have no Association of their own, and as we are all so intimately connected with the business of electric lighting, it would be better for us to get them together and help each other.

The Secretary—Another reason why I urge the adoption of Mr. Crockett's amendment, if he would consider any argument of mine: If anyone occupied the position I have five years steadily, or occupied the position of President, even for one year, he would appreciate the difficulty in getting papers on gas subjects, especially in the last two years. It is hard work. You have about gone over the field, and have not much more to draw from without repetition, which might become tiresome, while the electric lighting field has not been exploited at all. There have been no papers on that line, except perhaps in connection with the Association that was formed some time ago, which went to pieces; but the subject of electricity in combination with gas presents an unbounded field for papers. There is no limit to it at all, and while I have no fear about getting papers in the future, it will furnish topics for our discussion.

Mr. Eichbaum—It seems to me the amendment is right and proper, and it would be well indeed to have this end accomplished as soon as possible. I hope there is no conflict between the two gentlemen, that it is merely a choice of terms perhaps, and that they will amalgamate their ideas so as to have harmony. The changes suggested should be completed as speedily as possible, which in any event will require a year.

Mr. Clements—Perhaps I do not fully comprehend the resolution, as presented by Mr. Crockett; but it seems to me that his presentation of it is a trifle too broad. If the proposition had been confined to engineers connected with electric lighting it would be different, but such do not constitute all electric engineers, for a great many men who style themselves electric engineers have nothing at all to do with electric lighting. We go into a very broad field. Anyone might be engaged in any one of the various branches of electricity, and, as I understand the resolution, would be eligible.

Mr. Crockett—No, Mr. Clements; you will see, according to the way in which the resolution is written, it is declared: "To be eligible as a member, a person must be an active employee of a gas or electric company."

Mr. Clements—I suggest, electric lighting company.

Mr. Crockett—Well, we will put the word "lighting" in.

Mr. Clements—Because electric companies hang bells, and do all sorts of things.

Mr. Quilty—I was just telling a neighbor of mine that I thought Mr. Clement's point was well taken, because electricians who put up fire alarms, door bells, and so on, might be styled electric engineers. I think it should read "electric lighting company," so as to be in conformity with the gas lighting business.

Mr. Crockett—I think that point is not well taken, for the reason that the Board of Directors can always turn a man down whenever they choose. If the Board of Directors choose to let in bell hangers and men of that class, let them in, and you will not elect that Board again; but if you have confidence in the judgment of your Board of Directors, you will very soon find that they will not let in men who are ineligible.

Mr. Petch—In conversation with Mr. Crockett I understood that he did not propose to change the name of this Association, but simply to admit men who are connected with the electric lighting business. As far as I am concerned, I am heartily in sympathy with that kind of a movement. I expect the great majority of the members here present are directly or indirectly connected with an electric light plant, and I would like to come to this Association knowing I would hear papers read that would bear directly on the electric business. Those of us who have electric light plants to look after know how much good we could receive from papers written by men who would have experience similar to those in the gas business, perhaps, only differing in detail from the business in which they are engaged. For that reason I am heartily in sympathy with the resolution of amendment, and can see no reason why any harm could come to this Association from the adoption of such a resolution.

Mr. Clements—One word more; for I do not wish to be misunderstood in this matter. I know Mr. Crockett would not offer anything that would be likely to interfere with the harmony of this Association; but he, perhaps, and you and I and many others beside, will not be left always to define this Constitution. Everyone knows, who knows anything about the rules of organizations, that the constitutions of municipalities, states and governments are oftener defined, by others than those who wrote them, as meaning something other than their writers intended, and I wanted to avoid the possibility of that in the future. Of course I have every confidence in the gentlemen, and full confidence in the gentlemen who will hereafter be Directors, and all that, but to avoid the possibility of misconstruction, I suggested the addition of the word "lighting."

Mr. Gregory—I understand that that resolution has been rewritten since it was read. I would suggest that it be now read again.

The Secretary—There is no motion necessary now by the Association. It is simply presented and laid over for action next year.

Mr. Crockett—No action can be taken on it now further than to file it.

Mr. Gregory—I think you misunderstood me. Since it was read Mr. Crockett has marked it over and put in another word or two, and it has really been changed, and we may not understand exactly how it reads.

Mr. Crockett—I will read it over. It is as follows:

"*Article II.* Where word 'gas' is used, add 'electricity,' so as to read, viz.: Its object shall be the promotion and advancement of knowledge of the gas and electric business, including all matters relating to the construction and management of gas and electric works, and the manufacture, distribution and consumption of gas and electricity. To

establish a spirit of fraternity between the members by social intercourse and friendly exchange of information on the subjects of gas and electricity.

"*Article III.* To be eligible as a member a person must be an active officer or employee of a gas or an electric lighting company, or a person whose pursuits are connected with supplies furnished to such companies. By a three-fourths vote of members present at any meeting, the Association may elect as honorary members any gentlemen whose scientific or practical knowledge in matters relating to the gas or electrical industries and whose efforts and interests in that behalf shall recommend them to the Association."

ELECTION OF OFFICERS.

The President announced that the next business would be the election of officers. The final result of the balloting was the election of the following named gentlemen to serve in the capacities named:

President—Mr. F H. Eichbaum, San Francisco, Cal.

Vice-President—Mr. Charles F. Adams, Portland, Ore.

Secretary and Treasurer—Mr. John A. Britton, Oakland, Cal.

Board of Directors—Messrs. T. D. Petch, Eureka, Cal.; F. A. Cressey, Modesto, Cal.; H. P. Goodman, Napa, Cal.; John L. Howard, San Francisco, Cal.

The officers-elect having made suitable acknowledgment of the honor conferred upon them, and Mr. Clements having informed the members that the gas stove department and show rooms of the San Francisco Gas and Electric Company were open for their inspection, the President announced that the contents of

THE QUESTION BOX

would be considered. The first question was:

"Do you know of any device to prevent moisture gathering on show windows, where produced by combustion of gas flames within?"

The President called upon Mr. G. I. Kinney to reply to the query.

Mr. Kinney—Regarding the accumulation of moisture on the panes of show windows, while I may say I have never given the matter very much study, I always found the least trouble where the windows were well ventilated. The majority of show windows are poorly ventilated, if at all. Being closed to keep out dust, to repel insects and so on, the interiors of stores are not as a rule sufficiently ventilated to admit of proper combustion of the gas used, and the result frequently is condensation or deposit on the panes. Then there is the matter of heat on the outside of the pane, with a lesser temperature on the store side of the pane, with the result of more or less condensation. Dust and the like add to the degree of clouding. The least trouble occurs in this respect where windows can be and are well ventilated.

Mr. Grimwood—The description of a device for preventing this trouble appeared in the pages of the *Scientific American* some years ago; but I cannot call to mind the date of the publication. As I remember it the basis of the remedy suggested was that of passing a current of dry, warm air across the face of the pane. It was further said that the putting of jets of flames on the window panes had been tried; but the experience in that respect was, very often, the panes were cracked by the sudden change of temperature. The writer of the article further said he had arranged a system of hot air flues underneath the show window, the hot air being taken from furnace heaters or other ordinary source of such supply, and carried along into air chambers underneath the window, and allowed to pass up over the surface of the pane. He claimed it was a perfect preventive. I have never seen it tried, and cannot speak of its merits. I give it for what it is worth, although I cannot endorse it.

Mr. Tuthill—Having had a great deal of trouble in that line in the works in our city, I find that proper ventilation of the window is the most efficacious plan to adopt. Cut out a small pane or aperture in the upper part of the window, and insert in place of the removed glass a piece of wire gauze, having a mesh sufficiently close to prevent the entrance of insects. This, I think, will be of great benefit.

Mr. Clements—I adopted that plan in many instances with much success. It is an excellent method. If this Association had assumed its new name, I would tell you another method of preventing it.

The President—During the time that I conducted the Wrinkle Department I remember having asked that question, and some of the answers thereto were rather queer. One party stated it was impossible to reduce the quantity of moisture on window panes where water gas was being consumed; for excess of moisture was sure to follow its combustion. Another reply was that having tubes of the same diameter as the Welsbach burner extending from the ceiling of the window, taking the product of the combustion off from between the beams on the outside of the window, was the most effectual proposition that they had.

Mr. Clements—I presume this trouble is greater where fogs prevail and where the weather is subject to sudden changes, particularly in respect to the low scale of the thermometer. In our belt, where the thermometer usually ranges at 110°, the matter of moisture deposition takes care of itself.

Mr. Kinney—My observations show that ample ventilation or draught created by openings at the bottom as well as the top of the window, to carry off the products of combustion completely, is the most effectual.

Mr. Gillespie—Many of the newer buildings are being fitted as to their windows with sash frames, the ports in which are, as to their upper or lower halves, either glazed or screened. The practice seems to give satisfaction in the matter of preventing the deposition of moisture.

The President—The next question, which is "Has the lighting of show windows by outside Welsbachs ever been tried?" has been assigned for reply to Mr. G. I. Kinney.

Mr. Kinney—I prefer that one who has had more experience should answer the question, for my knowledge thereon has been obtained mainly from reports given in the technical journals of Eastern experiments. Possibly experiments in that direction have been made in San Francisco.

The President—Do any of the members know of conditions of that kind where the windows are lighted in that way?

Mr. Grimwood—I am told, and on pretty good authority, that in Paris the Welsbach is put outside of the window, and a shade (rather than a reflector) of some sort is placed behind it, so as to throw the light down on the window.

The President—Some years ago, in New York City, the proprietors of the large shops devoted to the sale of silverware and jewelry were rather averse to putting gas jets inside of windows, because of the liability of the products of combustion tarnishing their wares, and they used to place Argand burners outside, while inside was located a powerful reflector—not so large as a locomotive headlight, but after the manner of the latter—throwing a very strong light in the windows from the outside.

[To be Continued.]

Systems of Coal Mining in Victoria.

Mr. James Sterling, Assistant Geological Surveyor, contributes the following to the Annual Report of the Secretary for Mines, district of Victoria, New South Wales:

Of the several systems of mining for coal that known as the long-wall, originally developed in the midlands of England, has the most extended application in other countries. The pillar-and-room system, used principally in the north of England and Scotland, is being gradually superseded by the former. As most of the Victorian coal seams vary between 1 foot 6 inches and 5 feet in thickness, and in many districts are disturbed by lines of faulting in the strata, the question of the most efficient method of working becomes a matter of importance, not alone in order to win the coal at a minimum of cost, but also to insure proper safeguards to the health of those engaged in winning it. The only workings which have extended to a sufficient length underground to enable a comparison to be made comprise the Coal Creek and Coalville collieries worked on the longwall system, and the Outtrim and Jumbunna worked on the pillar and room system.

At the Coal Creek Proprietary's Mine, Korumburra, the system adopted is that known as the longwall, by which the whole of the coal is taken out in one operation, no coal being left as in the pillar and room system for pillars, except under the road near mouth of tunnel. The longer the line of face to be won the better the results, subsidence being uniform. In the area worked out at present the surface is now some 2 feet below the former level. Yet no appreciable damage through subsidence has been caused to the dwelling houses on the surface. Nearly 500 yards of a face was opened out, although divided into separate districts by faults. The gateroads are 22 yards apart (*i. e.*, the length of stalls), and are 3 yards wide with 9 feet packs built on either side. The packs are built with stone and debris from the roof overlying the coal at the gatehead. This work is done by the night shifts; it is known in the Midland counties of England as ripping, and in Scotland as brushing. Although the seam of coal varies between 3 and 4 feet in thickness, yet the gateroads when ripped are 6 and 7 feet high at the face of the stalls, *i. e.*, 3 feet in section of ripping being cut down in ordinary gateroads, and 4 feet in main roads. The ordinary gateroads are cut off by cross-gates, which are carried through the goaf,

and which are ripped and packed equal to the main roads. Such crossgates are used for the purpose of keeping the ordinary gateroads in repair, as well as to liberate the rails in the ordinary gates. Where the mine is free from faults the gateroads are cut off by crossgates every 200 or 300 yards. In the Coal Creek Proprietary mine the crossgates are put in to suit the circumstances of the mine. The props are set 4 feet apart, and not more than 1 foot from the face of the coal. It is claimed that for small or moderate sized seams of coal the longwall system as adopted at this mine has advantages over any other, for the following reasons: (*a*) All coal is won, none being left to support the roof as in the pillar and room system. (*b*) Saving in headings by dispensing with same. (*c*) Simplification in haulage—securing efficiency at a minimum of cost. (*d*) Less timber required, can be used over again if desired; goaf subsides gradually; gob filled up or stowed. (*e*) Air can be readily taken along the face of the workings in each district, less bratticing being required, return air by splits. On the whole, the longwall system reduces the cost of putting, supervision and materials (*i. e.*, rails, sleepers and brattice), and where subsidence does take place it does so uniformly, and so causes less damage to the surface. Accidents from fall of stone are less likely to happen in this system than in the room and pillar, as no coal is left below ground, and therefore spontaneous combustion of small coal crushed and ground together by falls of the roof is rendered impossible. The Coalville Colliery, where the seam is less than 2 feet 6 inches in thickness, is an instance of economic working by the longwall system.

In the Outtrim colliery the room and pillar, or, as it is known in Scotland as the stoop and room, system of working has been adopted. The usual practice under this system consists in drawing main roads, the dividing the coal into a series of rectangular blocks by means of drivages, known as bords (or rooms) and walls, the line of the latter being called headways' course. The rooms are generally driven from 4 to 5 yards wide at right angles to the "cleat" of the coal, or in other words, on the face. Headways' course are therefore parallel to the cleat. In most cases the walls are driven about 2 yards wide, but often both bord and walls are driven 5 yards in width. The usual practice is therefore to drive out main road or roads; then commence rooms and walls on either side, leaving sufficient coal on either side to prevent risk of creep; these pillars vary in size according to local circumstances. In the Outtrim mine the work has been laid out for wide rooms with small pillars; the latter are in some cases from 1 to 3 yards in thickness. At present the rooms are 6 yards, and large pillars 12 yards, a "cut through" being put in every 35 yards. It is claimed that by the room-and-pillar system a fair output can be obtained at a moderate cost very soon after starting, but the disadvantages are considerable. See notes on longwall system.

At the Jumbunna Colliery the system of working adopted is somewhat similar to that at the Outtrim, by room-and-pillar. The seam lies at an angle of 1 in 3, and owing to the position of outcrop and tunnel only a small portion can be worked to the rise; the main workings run to the dip. The main workings have been carried down between two faults. This condition (according to the manager) would, if the longwall system of working had been adopted, necessitate running two parallel headings down the center of the area, leaving so much coal to keep them good that the extent of workable coal on either side would have been very limited. It is also asserted that the faults occasionally met with would have caused deviation of the roads and other difficulties which would be very hard to surmount with longwall workings. It is also pointed out that there is a considerable amount of water to cope with in this mine, and that by the adoption of the longwall system of working there would be (unless the workings extended to a great depth below the surface) a danger of breaks occurring which would allow a large influx of surface water. Although an air shaft and furnace exist for ventilation purposes, yet, owing to the methods of working adopted, the air from the intake adit has to pass through the old workings, and may become vitiated by gases accumulating in the old workings before it reaches the working faces.

A Course of Study in Electrical Engineering.

[A paper read by PROF. R. B. OWENS, University of Nebraska, before the Society for the Promotion of Engineering Education.]

My object in presenting the following paper is to call attention to the difficulty with which instruction in electrical engineering is kept abreast of the current development of the subject, and to point out certain expedients found useful, in this connection, in a school distant from the larger industrial centers, and in maintaining a sustained interest on the part of the student and fitting him more quickly for the responsibilities of engineering work.

The unparalleled growth of electrical industries in the past decade and their present increasing rate of development make the task of bringing the school work to correspond to best engineering practice seem an almost hopeless one. But unless such a correspondence does obtain, an injustice is done the student, at least if he is allowed to believe that the work he is doing is strictly professional work similar to to the work done in the best schools of law and medicine.

To be sure it is contended by some that it is only within the province of the school to impart the broader principles that underlie engineering in general and its several branches in particular, but a careful study of the possibilities of technical training very clearly shows that much of the time now spent by the student in learning to apply general principles might be saved if in the last year or two of study he is brought into closer relation with the methods and practice of our more successful makers and best constructing engineers.

I do not wish to be understood as saying that all the details of dynamo manufacture, street railway construction, etc., can even be touched upon in a course in electrical engineering. Such details vary so rapidly as to make it impossible for a school to follow them, even if it were advisable. However, it is generally known, outside of the schools, that little information of real value, relating, for instance, to dynamo design, not electric and magnetic theory on the behavior of particular dynamo machines, is obtainable in the greater number of courses in electrical engineering in this country. Such a condition, when looked at fairly, is readily explained. The men who to day are successful designers of dynamo machinery and builders of electric lighting and railroad properties that pay, are so constrained by business relations as not to be able to conduct college work, and college men when summer comes take refuge as a rule in the country rather than in a shop or factory, and so begin their autumn work with small additions to a usually scant fund of practical information.

However, the electrical manufacturer and lighting and street railway managers are generally glad to assist the schools, as many who have received courtesies at their hands can testify, and if close relations between the school and practice do not obtain it is the fault of the college man. In short, the college man should work as hard during his so-called vacations in collecting material for the coming season's lectures as he does during the scheduled period for conducting classes. The instructor in electrical engineering has, of course, the newness of his subject as a special difficulty to contend with, but if the practice is followed of visiting every year the plants of the manufacturing companies, typical lighting and power stations, etc., information is obtained which cannot at present be found in engineering literature, and which has the highest value for instructional purposes. In engaging an instructor in technology it should be with the understanding that cultivating close relations between college work and outside practice is a part of his duty, and a limited consulting practice when not conducted to the injury of the practicing engineer should be encouraged.

I have adopted the following practice in teaching dynamo design: First, the student is drilled in the theory of electro-magnetism and the magnetic circuit and is then required to fill out in detail the same data sheets that are used by our best manufacturing firms, for a number of machines of which working drawings are available. I find this especially useful in giving the student an idea of the proportions which do obtain or have obtained between the parts of single machines. Next curves and tables are made, showing the variations in the principal proportions of machines of different types and sizes. This gives the student an idea of the change in particular proportions with conditions of service and output. Necessarily the data possessed by a technical school is not of the latest, but supplementing it by the information secured each summer, a very close approximation to correct practice is obtained.

Having worked over all the material available, the present tendencies in dynamo design are pointed out as well as can be and explanations given. Then a line of machines for certain assumed conditions is decided upon and each student takes one machine. The work after this is largely at the drawing board. The advantage of having all students working on machines of the same type, but of different dimensions is, that by comparing notes they are able to see clearly the necessary change in dimensions as the output, etc., of the machines varies.

A line of standard D. C. and A. C. machines are always required, and special machines, if time allows. All drawings are made uniform and complete data sheets filled out for each machine. Next the data and drawings are submitted for criticism to some one whose business it is to design machines to maintain the reputation of and earn an income

for those who invest their money in the manufacture of electrical machinery. In this way it is attempted to give the student salable information without sacrificing principles to unnecessary detail.

Lectures on electrical lighting, street railways and general installation work are supplemented by a required design of a lighting or railway plant. A number of scale drawings of towns of various sizes are available and from known or assumed conditions the station is located. Then, if it is a lighting plant, the location of individual consumers is assumed with particular load diagrams for each. From the individual load diagrams the nature of the station load is determined and the machinery and circuits laid out. All circuits are calculated and shown on the map together with poles and important accessories. Setting plans for standard machinery are readily obtainable and the station arranged accordingly. This is, of course, the ordinary preliminary survey of the consulting engineer. Next, full specifications for the plant are drawn definite as regards results to be obtained but impartial as regards standard apparatus. Well drawn sets of similar specifications are, of course, available to the student and criticised for his benefit.

Lastly, a bill of material is made and costs are worked out for some one type of standard machinery from price lists and labor estimates, and the cost of operation and maintenance and necessary income determined to make the plant a paying investment. Such station plans and estimates are then checked by a constructing engineer, whose routine work keeps him directly in touch with such matters.

The tendency to carry system to an extreme in some engineering laboratories is greatly to the student's disadvantage. If on entering a laboratory a student is met with a long list of inconsequent experiments, handed a batch of laboratory forms and told to begin observations with apparatus already set up by a laboratory assistant, his interest in research takes rather a sudden fall. Having explained the use of instruments, the general methods of dynamo testing and the peculiarities of particular machines, better results are obtained by turning over to a group of students a dynamo with necessary testing apparatus and letting them work out results as far as possible unaided. Care must be taken, however, to point out the tests that have a commercial value.

After having equipped a dynamo laboratory with machines of standard type to furnish current in necessary quantity and at convenient voltage I believe the remaining space should be filled with what in effect are simple testing blocks. Then as new machines come upon the market they can be borrowed, tested and returned, giving new apparatus for investigation without finally making a junk shop of the laboratory.

I believe very thoroughly in the value of a thesis requirement for undergraduate technical work. It is not expected that such theses will develop new principles in engineering as some seem to expect, but very much valuable data as to the various types of new apparatus continually coming out is obtained, and the student learns to assume responsibility by being in a large measure left to his own resources.

Another expedient of utmost importance in bringing schools of electrical engineering into close contact with current development is that of having specialists in the several fields of practical work give courses of lectures detailing the status and probable development of their work. One lecture by a distinguished engineer, while it interests for an evening, does not meet the requirement. I find courses of about ten lectures to cover satisfactorily such special topics as the design and construction of power plants, electric measuring instruments, etc. On these courses of lectures the student should be examined as upon work given by the ordinary instructors. So long as instruction in electrical and other special branches of engineering cannot in general be preceded by longer courses of preliminary training due to the pressing demands for technical information made by the recent enormous growth of our industrial interests, the granting of a full engineering degree for the ordinary four years of college work seems unwarranted. The recent graduate is not an engineer; we only hope he has the capacity to become one. A safer course, and one which I have adopted in granting the degree of Electrical Engineer, is to require certain additional or graduate work after the bachelor's degree, and the full degree is conferred at any subsequent time when the applicant presents a dissertation showing that he has actually planned and carried out electrical work of some importance. If such a practice were general, I believe the degree would secure more attention than it does at present. A continued effort should also be made to raise the entrance requirements to engineering courses. This will finally be effective I think in bringing the special branches of engineering into our graduate schools along with other strictly professional work.

Explosion of a Tar Still, with Fatal Results.

Engineering, in reporting the investigation of an explosion of a tar still, which explosion was attended with fatal results, says:

A formal investigation has been held at the Manchester Town Hall by the Board of Trade, under the provisions of the Boiler Explosion Act, with regard to the explosion of a still, used in the distillation of tar, which occurred at the Bradford Chemical Works, near Manchester, on the morning of June 17, whereby two men were killed. The Commissioners were Mr. Howard Smith, Barrister-at-Law, and Mr. J. H. Hallet, Consulting Engineer. Mr. Gough appeared for the Board of Trade, and the owner of the still (Mr. Hamer Lockwood) was represented by Mr. Rylands, of the firm of Messrs. Boote & Edgar, Solicitors, Manchester. Mr. W. Cobbet, Solicitor, watched the proceedings on behalf of the relatives of the deceased men.

Mr. Gough in his opening statement said that the still in question was an iron cylindrical vessel with a hemispherical top and a partially dished bottom, the cylindrical portion being 12 feet in diameter by 7 feet high with plates $\frac{7}{16}$ inch thick. The still was fitted with a charging tap, through which the tar or anthracene oil could be run in by gravity from storage tanks, or passed in by means of a small donkey pump. There was a dip-hole at the top for testing, by a rod, the height of the liquor in the still, and for ascertaining how much the liquor expanded during the distillation. The dip-hole was closed by means of a plug. A swan-neck was fixed on the top of the still for carrying off the gases, as they formed in the still, through a range of cast iron piping 24 feet in length, to the condenser. At the end of this range of piping, immediately over the condenser, a small safety valve was fixed. The condenser consisted of a cylindrical tank 6 feet in diameter and 7 feet 6 inches in height, standing on brickwork and containing a worm formed of 10 coils of pipe of 4-inch bore, and 3 feet 6 inches in diameter over the coil. During the process of distillation the man in charge of the still, it was stated in evidence, should see that the coil was clear. When the fire under the still was alight and the contents of the still became heated, it was his duty to note that a certain kind of oil or vapor passed through the end of the coil. If that sign were not present it was clear that the coil was choked through the solidification of the anthracene oil which had previously been passing through, and it was the man's duty then to lift the plug from the vent-hole at the top of the still, and if he found his suspicions verified he ought to put out the fire immediately. What was done by the stillman just before the explosion there is no evidence to show, as he and another man were killed. The explosion occurred about 10:30 o'clock on the morning of Thursday, June 17. About 20 tons of tar had been run into the still by 8 o'clock or thereabouts; the fire was then lighted, and all was supposed to be right, when 2½ hours later the still exploded. The bottom of the still was ripped all the way round, and the shell was projected over a wall 10 feet high, and landed about 30 yards away.

After touching on other matters, and calling various witnesses, Mr. Gough put the following questions for the consideration of the Court:

1. Was the still properly constructed, and was it of sufficient strength for the purpose for which it was intended?

2. Was it fitted with proper and sufficient mountings, and was the safety valve placed in a proper position?

3. Was the still carefully worked on the night of June 15 and 16, and were proper measures taken to prevent solidification of the anthracene in the pipe or condenser?

4. Was it possible for the stillman to ascertain whether the outlets were clear, either before admitting tar into the still or before lighting the fire on the morning of June 17?

5. Were proper measures taken to insure that the still was being worked under safe conditions?

6. What was the cause of the explosion and loss of life?

7. Whether blame attaches to Mr. David B. Jones (manager) and to Mr. Hamer Lockwood (owner), or to either of those gentlemen?

Mr. Howard Smith, in delivering judgment, said that the Court were of opinion that the explosion was caused by the pipe leading from the still to the condenser being sealed up—the exact point of sealing up they were not able to determine—and that this stoppage was caused by the congealement of the anthracene therein, which congealement was due to a fall of temperature, the pipe being exposed to the air. The still, therefore, could not be freed from the pressure which was accumulated after the lighting of the fire, as the dip hole plug, which was supposed to act as a safety valve, was found in the hole after the explosion. According to the evidence of Mr. Buckwell, Engineer-Surveyor to the Board of Trade, the pressure at which he would expect the still to burst would not be greater than from 5 pounds to 10 pounds per square inch.

In answer to the questions asked by the Board of Trade, Mr. Smith said the Court had to state that in their judgment the still was properly constructed and of sufficient strength for the purpose. It was not, however, fitted with proper and sufficient mountings, for it had no safety valve, those which were supposed to do duty as safety valves being of no real value. The still should have been fitted with a safety valve of sufficient area to free it from all accumulation of pressure, and that valve should, in the opinion of the Court, have been placed on the swan-neck. As, however, it was not customary to fit these stills with safety valves in that fashion, and as Mr. Lockwood had evinced a readiness to comply with any suggestion for insuring greater safety in the future, the Commissioners were of opinion that no blame attached either to him or to Mr. Jones his manager. Under these circumstances they made no order as to costs. They remembered that stills, fitted like the one which exploded, had been worked by Mr. Lockwood and other chemical manufacturers for many years, and although the Court condemned the absence of an efficient safety valve—because they thought that had there been one in the present case the explosion would not have occurred—they did not consider that either Mr. Lockwood or Mr. Jones was to blame.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

An ordinance for the future governing of the relations between the city of Houston, Texas, and the Houston Gas Company, is now before the Board of Aldermen. The ordinance grants the Company the right to extend its main system and to replace and repair its main and service pipes for a period of 30 years, provided it fixes the maximum rate for its gas at $1.80 per 1,000 cubic feet, the gas to have an illuminating value of not less than 18 candles. The franchise is not to be exclusive. The ordinance also directs that in putting in services for consumers the Company shall charge only the actual cost thereof, plus 10 per cent. No meter rent may be charged.

THE proprietors of the Caracas (Venezuela) Gas Company have filed an objection against the action of the authorities in granting to New York parties the right to operate an electric light and power company in Caracas. The objectors claim that under their agreement with the Government they have the exclusive right to furnish artificial light from a central station in Caracas.

A CORRESPONDENT in Springfield, Mass., forwards the following: "Mr. Charles Deuel died at his home on North Prospect street, Amherst, Mass., on the morning of August 25th, after an illness that lasted for several months. Mr. Deuel, who was one of the oldest and most respected citizens of Amherst, was born in Cambridge, N. Y., October 24th, 1822. On attaining his majority he moved to Williamsburg and entered the employ of Messrs. Thayer & Co. He subsequently removed to Amherst (about 1853) and entered the service of M. A. Allen as a clerk. In 1857 he bought out a drug store on Phœnix row, and for 40 years continued in that line of trade. He had been connected with Grace Episcopal Church since its organization, being one of the first vestrymen, and was always a liberal contributor to its funds. He was a Director in the Amherst Water Company, and was one of the original shareholders of the Amherst Gas Company, of which corporation he was President and Treasurer at the time of his death. He took an active part in the recent enlargement of the electric light plant, and was an active promoter of the Amherst and Sunderland Street Railway Company. He was also heavily interested in Amherst real estate. For several years he was Secretary of Pacific Lodge, and was deeply concerned in many local charities. His wife and three sons survive him. The funeral services were held on the afternoon of August 28th and interment was made in Wildwood Cemetery."

A. W. GUTHRIE, who owns property along the Des Moines river, at a point below the location of the works of the Capital City Gas Light Company, of Des Moines, Iowa, has brought suit against the Company to recover damages in the sum of $300. He alleges that the drainage from the gas works enters the river above his premises and has so contaminated the water that the portion thereof which soaks through the sand drift under his property has fouled the water in his wells so that it is rendered unfit for any use.

THE McDonald Natural Gas Company has notified the residents of Washington, Pa., that hereafter they will be obliged to take their gas supply through meters. A deposit of $5 for each meter will be exacted. The rate is to be 20 cents per 1,000 cubic feet, with 10 per cent. off for prompt payment.

SUPERINTENDENT FRANK BRUEN is busily engaged in completing the improvements on and extensions to the plant of the Tampa (Fla.) Gas Company. The success of the Tampa Company has been nothing short of remarkable.

CAPT. DANIEL WEBSTER LEE, a prominent resident of Chelsea, Mass., and Manager of the Globe Gas Light Company, of Boston, died on the evening of Friday, August 27th. Capt. Lee was born in Manchester, Mass., in 1832, and was a grandson of Isaac Lee, commander of the ship Polly, of the Colonial navy, in revolutionary times.

ARTICLES of incorporation were recently filed in the office of the Clerk of Atlantic City, N.J., announcing the formation of the Columbia Gas Illuminating Company. The incorporators are Messrs. Henry J. Bergman, Anthony Kenning and George A. Bourgeois. The stated objects of the concern are the manufacture of mantles and fixtures for incandescence gas lighting. The factory and general offices are to be in Atlantic City, and it is proposed to establish branch offices in New York, Philadelphia, Chicago and San Francisco.

ARTICLES incorporating the Pennsylvania Fuel Gas Generator Company have been filed in the office of the Clerk of Camden, N. J., by Messrs. J. Leighton Westcott, W. W. Mines, Charles Hollinshead and Arthur L. Osgood, all of Camden. The capital stock of the Company is $80,000, and the object of the Company is to make and sell all kinds of gas and oil generators.

THE Board of Gas and Electric Light Commissioners have granted the application of the Cottage City (Mass.) Gas and Electric Light Company for the right to issue $15,000 in bonds for the purpose of paying the present floating debt and the cost of additions to the existing plant, the bonds to run 20 years, and the rate of interest to be 6 per cent. Of the sum allowed, $5,000 is to be used for installing an incandescent electric lighting plant; $2,500 for other additions; and $7,500 for payment of debt. None of the money is to be used for repairs. Respecting the application of the Gardner Gas, Fuel and Light Company, for the right to issue $18,000 mortgage bonds, to complete payment of original purchase of plants, and for enlargement, the Board approves an issue of $15,500 five per cent., 20 year bonds; $12,500 for completing payment for real estate and plant, and $3,000 for enlargement and extensions.

MR. MATTHIAS STRATTON, SR., a veteran gasfitter of Philadelphia, who died recently, was born in Worcestershire, England, in 1821. At the age of 7 years he was brought to this country by his parents, and for 69 years he had been a resident of Philadelphia. After learning his trade, Mr. Stratton and his brother commenced business as gas works builders, under the firm name of Stratton & Brother, with headquarters at Eighth and Jayne streets, Philadelphia. They were very successful, and remained in trade until 1881, when the subject of this sketch retired to private life. On pretty good authority it is stated that the firm of Stratton & Brother put in the gas piping in the White House at Washington (in 1849, during the Presidential term of Zachary Taylor), and so pleased was President Taylor with the way in which the work was done that he wrote a personal commendatory note to the firm and also sent a portrait of himself. Mr. Stratton superintended the erection of gas plants in many cities of America, and was the inventor of a patent gas regulator for controlling the various lines of lights in theaters and other public places. At the time of his death Mr. Stratton was the oldest member of Mount Moriah Lodge, No. 155 F. and A. M. He leaves one son, Mr. Matthias Stratton, Jr., of Newark, N. J., and a daughter, Mrs. Charles F. Miller, of 1815 Mifflin street, Philadelphia.

THE annual meetings of the shareholders in the Rockland, Thomaston and Camden Street Railway Company, and the Knox Gas and Electric Company, were recently held at the Thorndike Hotel, Rockland, Me., on the 25th ult. The officers named to manage both Companies were: Directors, George E. Macomber, John F. Hill, E. K. O'Brien, W. T. Cobb, W. S. White, S. M. Bird and H. L. Shepherd; President, George E. Macomber; Treasurer, A. D. Bird; Clerk, Herbert M. Heath.

THE Elyria (O.) Gas and Electric Light Company has filed papers of incorporation. The negotiations for the consolidation of the lighting properties of Elyria have been underway for some time.

A CORRESPONDENT informs us that the proprietors of the Newport News (Va.) Gas Company have decided to expend $65,000 on the con-

struction of a plant, instead of the $40,000 investment originally contemplated. A site on Hampton avenue has been purchased, and the prospect is that the works will be completed by or before January 1, 1898. The Directors of the Company are: W. J. Payne, Samuel Regester and F. S. Meyers, of Richmond; and C. M. Braxton, of Newport News. Mr. Payne is President of the Company.

MANAGER MCGREGOR, of the Pawtucket (R. I.) Company, is completing a well planned system of main extensions, which system covered the piping of the district known as Valley Falls.

THE business offices of the Greenfield (Mass.) Company have been removed to the Mansion House.

THE new holder for the Newark (N. J.) Gas Company, at its Front street station, is well underway. This holder, which is being constructed by Messrs. R. D. Wood & Co., is to rest in a steel tank, is to be of the 3-lift order, and will have a containing capacity of 550,000 cubic feet. At its Market street station the Company is completing a 3-lift holder, with a capacity of 400,000 cubic feet. This holder replaces another of very much smaller size, that was built in the early fifties.

A BILL is being prepared by several leading physicians of Pennsylvania for presentation for action by the Pennsylvania Legislature, which has for its object the abolishing of hanging as a capital punishment, and the substitution therefor of asphyxiation by gas as the proper method of administering the death penalty.

THE official gas inspector for Kansas City, Mo., Mr. L. F. McClure, has completed the equipment of his office, and is engaged right along in testing the quality of the gas supplied and in proving up the meters that are turned over to him for inspection. Under the local gas ordinance the Kansas City Company is required to supply a gas of an illuminating value of at least 22 candles.

MR. WALTER H. NORTON, a collector for the Portland (Ore.) Gas Company, has been arrested, charged with embezzling moneys.

AN interesting feature of the growth of the business of the New Bedford (Mass.) Company is shown in the increase in the sales of gas for cooking and heating. It was about 1880 that the Company began the system of renting stoves at a low figure, in order to increase the day consumption of gas, and quite a little work was done in the way of advertising in order to cause the people to have a better knowledge of the advantages of gaseous fuel. Up to 1890 some 700 or 800 stoves of various sizes had been placed and were doing good work in the way of increasing the Company's receipts. A new system of advertising was then adopted, demonstrations being given by women experts to show the practicability and advantages of cooking by gas. This has been followed every year in various ways, together with more advantageous methods of placing the stoves, by actual sale instead of rental, so that at this time it is estimated that not less than 1,500 to 1,700 stoves are now in daily use in New Bedford, at a great saving of expense to the users, and lightening housework in the saving of dirt, trouble and time in a very marked degree. The day consumption of gas as shown by the station meter demonstrates this very clearly. For instance, in July, 1892, the amount of gas consumed during the daytime was 926,100 cubic feet, or 20 per cent. of the total make. In July, 1897, the day consumption was 2,026,800 cubic feet, which is over 41 per cent. of the total make. The sales of gas are increasing in a very satisfactory ratio, each month, almost without exception, showing an increase over the sales of the corresponding months of previous years. The large cut in the price of gas, made July, 1896, reducing the gross rate from $1.80 to $1.50, has probably largely contributed to this result, and the large discount of 25 per cent. on sales of over 4,000 feet per month, bringing the net rate to $1.12½, is the lowest price in the State of any Company the output of which is no larger than that of the New Bedford Company.

THE Washington (D. C.) *Star*, referring to the public lighting of the suburb of Washington known as Eckington, says: "Owing to unsatisfactory service rendered, 106 incandescent electric lamps in the subdivision of Eckington will be replaced within a few days by gas lamps and a general rearrangement of their location made. Under date of August 20th the President of the Washington Gas Light Company informed the Commissioners of the purpose of the Company to lay gas mains in all of the principal streets of Eckington. This was in accordance with the numerous requests the Company had received from citizens living there for gas service. The Company asked to be favored with the street lighting in that section. The receipt of this letter recalled a letter of Chairman J. M. Leitzell, of the Committee on Streets, Sidewalks and Lights of the Eckington Citizens Association, asking that some means be employed to place street designations on the street corners, as their absence was the cause of much complaint. By the substitution of gas lamps for incandescent electric lamps this last request can be adjusted, and, it is claimed, a better service of lighting inaugurated. Reference of the papers to the Superintendent of Street Lighting of the District was made, and he submitted the following report upon the subject: 'Regarding the accompanying communication of the Washington Gas Light Company with respect to the gas mains now being laid by it in Eckington, I have the honor to report that this extension of its mains will cover every street in that subdivision in which the District now maintains incandescent electric lights. This latter service has for some time been unsatisfactory. Frequent interruptions have occurred, leaving the whole section in darkness. The arrangement of the lamps is not of the best, no change having been made since the service was first maintained by the District. Quite a number of the lamps are so located as to be entirely obscured by the foliage. No extensions of this service can be made without running additional overhead wires, which is now prohibited by law. As a much better service can be obtained with gas and a better distribution made of the lamps, I would recommend that the incandescent electric lights in that section be discontinued and gas lamps erected in place of them. This will enable the department to designate the streets, which has not heretofore been done, owing to the fact that no practicable sign has been found which is suitable under the present system of lighting. The absence of street signs in this section has been a cause of much complaint on the part of the residents.'"

DURING the week ended August 21st the Winnepesauke Gas and Electric Company, of Laconia, N. H., completed a series of six demonstration lectures on cooking by gas, which were largely attended, much to the satisfaction of the Company and the demonstrator, Miss Lucy C. Andrews. Two lectures were given each day, the first at 9:30 A.M. and the second at 2:30 P.M. The auditorium was the handsome meeting room of the Masonic Building, and, as said before, the lectures were in every sense a success. The Superintendent of the Company, Mr. J. H. Bledsoe, in addition to arranging for the lectures and demonstrations above noted, has compiled and is distributing a taking little pamphlet, bearing the title of "The Care and Economical Use of a Gas Range," which puts out many reasons why gas should be the fuel of the kitchen.

THE City Council of South Bend, Ind., is said to have granted to Mr. Peter English a franchise for the operation there of a gas plant. Under the provisions of the ordinance English agrees to supply gas on fuel account for 50 cents per 1,000 cubic feet, the rate for an illuminating supply to be 75 cents per 1,000.

A MAN named Eldridge is endeavoring to dispose of acetylene rights in the State of Texas. Texas is a big place, and we imagine that its regular gas interests will allow Mr. Eldridge plenty of room to show his wares; but that is all.

REPORTS of increased sendout come to us from all sections of the country.

Electricity vs. Gas for Lighthouse Illumination.

The London *Journal* mentions that in the course of a review of lighthouse progress during the past 10 years, which recently appeared in *Nature*, Mr. J. Kenward dealt with the various illuminants employed in the lighting of the coasts. He expressed the opinion that the maximum intensity of illumination is to be found in the electric arc; but the light is very sensitive to atmospheric conditions, and in thick weather it parts with its power in a much greater ratio than does a gas or even an oil light. There is a degree of fog which quenches the sun; while the large luminous surfaces of the superposed lenses project on the fog a reddish coloration, and the fog itself thus becomes a signal to the mariner. It would, however, be most dangerous for him to approach the coast presuming on this quality of a light in the vicinity of which he supposed himself to be. Mr. Kenward referred to Mr. J. R. Wigham's well-known arrangement for the superposition of lens lights, each with its own gas burner, as an obvious means of gaining power; and he cited the triform Tory Island light, fitted with these burners, and variable in power from 17,500 to 326,500 candles, as an illustration

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MONDAY, SEPTEMBER 6, 1897.

Durability of Water Pipe, Los Angeles.

Engineering Record says that in making an investigation into the condition of the present distribution system of the Los Angeles City Water Company's plant, City Engineer J. H. Dockweiler examined 318 pipes taken at random in different parts of the city, the exterior of the pipe being all that was examined as a rule. Of the 300 odd miles of pipe in the city about 68 per cent. are made from wrought iron and sheet iron, while about 32 per cent. of the mains are made from cast iron. Neither wrought iron nor sheet iron, except in isolated cases, has shown itself to be the material best suited for Los Angeles soil. All cast iron pipes in the ground except a few injured by electrolysis were in a good and serviceable condition. Although in a number of instances the appearance of rust has made itself observable on the exterior of the cast iron pipes, still the rust has not deteriorated the pipes to any extent, nor is any serious deterioration caused by salts or chemicals within the soil to be anticipated in the cast iron pipes now in the ground. The first cast iron pipes laid in Los Angeles in 1869 were uncovered and found to be in a perfect state of preservation, the asphalt covering alone having entirely disappeared. The asphaltum covering in all cases and on all pipes, whether cast iron or wrought iron, is poor, and seems to succumb to the action of the soil in a comparatively short time. In sandy or loam soil the bare metal remains unaffected, while in the hard adobe soil a slight incrustation of rust is observable, without, however, harmful effects on the cast iron. The probable life of the present cast iron pipes is estimated at not less than 40 years from date.

The wrought iron pipes, mostly of 2-inch or 3-inch size, are, with the exception of newly laid pipes, incrusted with rust on the exterior, and deteriorate rapidly. Quite a number of badly rusted 2-inch wrought iron pipes were found.

Aside from this fact, the insufficient size of the 2 inch and 3-inch pipes to supply water for domestic purposes, and the necessity of having to parallel these pipes with larger mains, in the event that fire hydrants should be placed on streets now provided with 2 or 3-inch pipes, is suggested.

The sheet iron pipes which form part of the pipe system were found to be in various conditions. In certain sections of the city, favored by local conditions of the soil and under light pressure, these sheet iron pipes were found to be in perfect state, while in other sections comparatively new pipes were found to be badly deteriorated; in some cases utterly ruined by rust. The wrought and sheet iron pipes seem particularly unfitted for use in the adobe soil, their deterioration there being quite marked.

As illustrative of the difficulties under which water works engineers in the West must have worked during the "boom" period, the following extract from Mr. Dockweiler's report will be of interest:

"The distribution system, as a whole, seems to be designed irrespective of engineering rules, and without the view of obtaining the best results by the aid of approved appliances. It is an assemblage of various pipe systems, originally laid down with economic propensities and without reference to ultimate extensions. From time to time new sections of the city were added to the nucleus thus obtained, and great engineering skill, indeed, was needed and brought to bear upon making and maintaining such a large system as the present with such means at hand.

"It is safe to assert that there is not in the United States at present another such water works system which tries to accomplish as much as the Los Angeles water works system, with such a vast number of pipes of such vastly disproportionate sizes.

"While a great number of the pipes are deteriorated by age or the action of the soil, nevertheless the mechanical skill expended in maintaining the system is remarkable, as investigations show but a comparatively small percentage of waste by ground leakage.

"The newly laid cast iron pipes, specials and fittings, as well as the newly constructed main conduits, tunnels and reservoirs, are in a very good condition and skillfully executed, and of approved form, while, on the contrary, among the nest of older pipes and conduits hardly 50 per cent. will stand the test of increased pressure necessarily made by the demands of an increased consumption."

The Market for Gas Securities.

The "prominent director" is not often quoted just now as declaring that no negotiations looking to the consolidation of the various gas interests are underway. A very important conference was held yesterday (Thursday), at which it was determined by the slight interest in opposition to the merging plan that such opposition should cease. Everything on the city gas share list is soaring, as our current quotations show; in fact, it seems a trifle odd to have to say that Standard common is worth 144; but that figure is bid for it. Meanwhile the stock on the list which affords the greatest opportunity for profit is undoubtedly Consolidated, at the ruling quotations.

Brooklyn Union is 121½ to 122, and Laclede scored a high record during the week. The common is bid for at 49½. Boston United gas seconds are worth 80 to 81, while Bay State stock is unaccountably weak, at 13⅞. Chicago gas is 105⅝ to 105½, and herculean efforts are being made to keep Detroit gas at 40 "or better." Baltimore Consolidated is steady, at the quotations of last week.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

SEPTEMBER 6.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,480,000	100	195	195½
Central	500,000	50	195	..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	300	..
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	285	290
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	85	
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	96	97½
Preferred	2,000,000	100	120	122
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	105	106½
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	144	150
Preferred	5,000,000	100	150	157
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	115
Yonkers	299,650	50	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	121½	122
" " Bonds (5's)	15 000,000	1,000	114	114½
Bay State	15,000,000	50	14⅜	14⅝
" Income Bonds	2,000,000	1,000	..	35
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	93	..
2d " " "	3,000,000	1,000	80	81
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co.	25,000,000	100	105⅜	105½
Chicago Gas Lt. & Coke Co.				
Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,069,000	.	90	91
1st Mortgage	1,085,000	..	..	96
Consumers, Jersey City	2,000,000	100	78	77
" Bonds	600,000	1,000	101½	103
Cincinnati G. & C. Co.	8,500,000	100	203	203½
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	1,000,000	100	59	60
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000	.	40½	41
" Con. Bonds	4,312,000	..	91½	92
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	83	84
" Bonds	2,000,000	..	93	95
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	152	155
" Bonds, 6's	2,650,000	..	107	109
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	88	89
Bonds	1,000,000	1,000	92	94
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	49¼	49¾
Preferred	2,500,000	100	94	98
Bonds	9,034,400	1,000	100⅛	103
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	142	..
Bonds, 6's	4,000,000	..	123	..
New Haven	1,000,000	25	225	..
Oakland, Cal.	2,000,000	..	53½	54
" Bonds	750,000	..	..	..
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105

Peoples, Jersey City	500,000	50	..	175
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	88	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	94	94½
St. Paul Gas Light Co.	1,500,000	100	49	51
1st Mortgage, 6's	650,000	..	84	87
Extension, 6's	600,000	..	..	..
General Mortgage, 5's	2,400,000	.	88	90
Syracuse, N. Y.	500,000	25	..	..
Washington, D. C.	2,000,000	20	250	..
Western, Milwaukee	4,000,000	100	87	88
Bonds, 5's	3,556,000	.	98	100
Wilmington, Del.	550,000	50	200	202

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OFFICE OF WELSBACH COMMERCIAL COMPANY,
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The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Sept. 10, 1897, to stockholders of record at the close of business Aug. 31. Transfer books of the preferred stock will be closed from Sept. 1 to Sept. 10, both inclusive. Checks will be mailed

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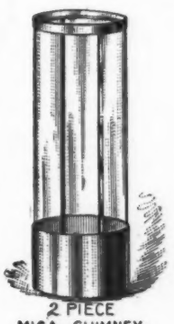

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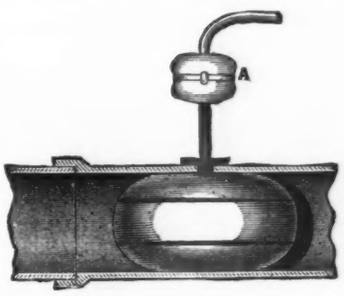

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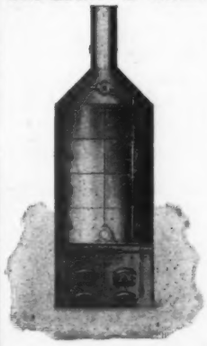

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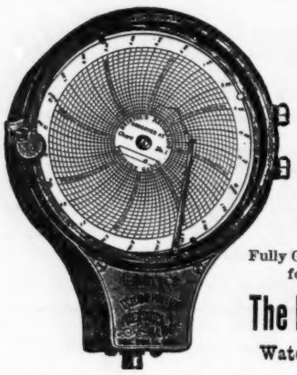

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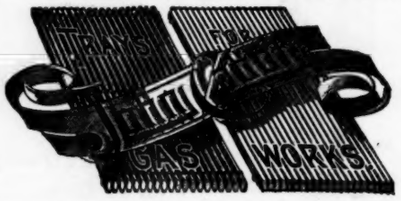

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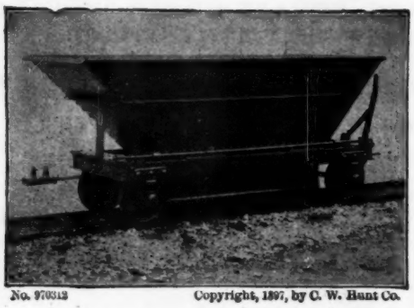

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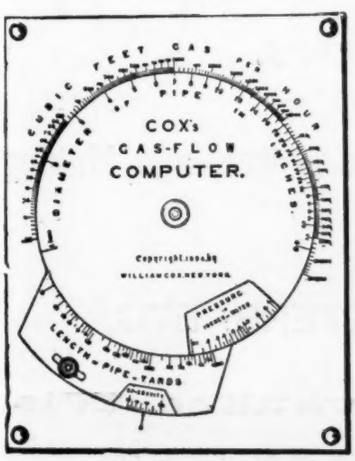

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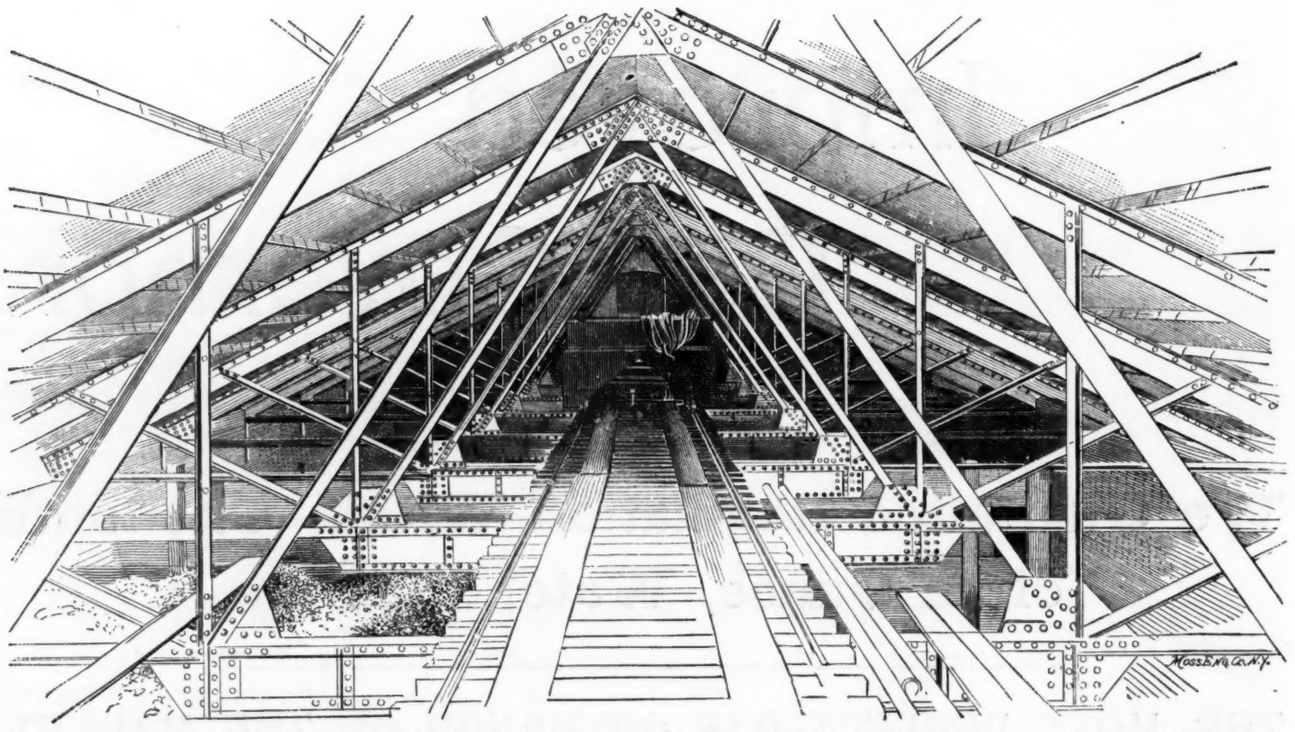

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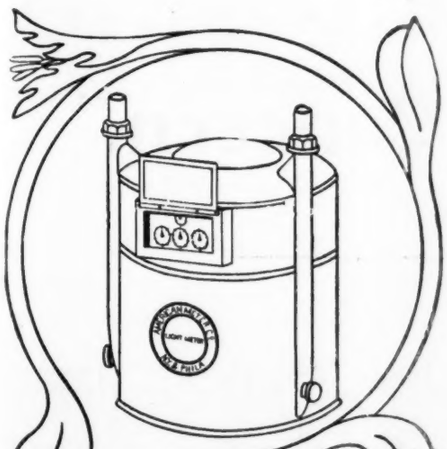

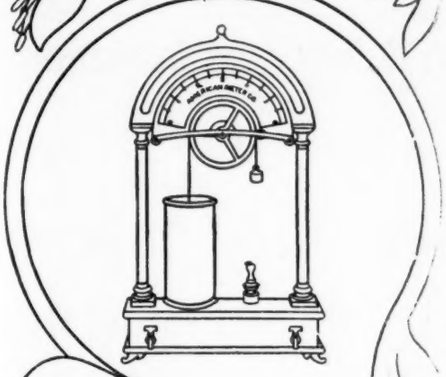

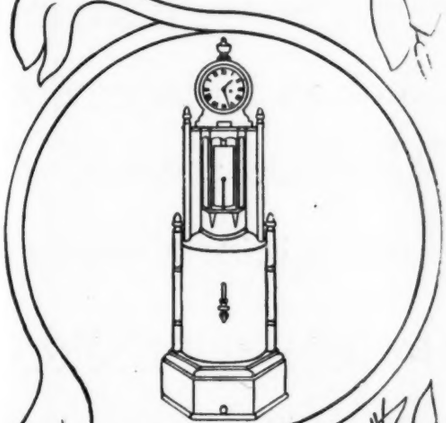

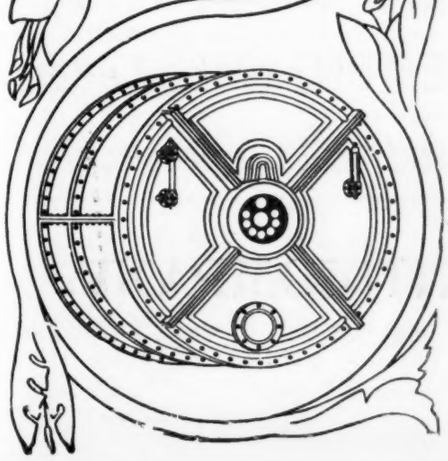

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NEW YORK AND PHILADELPHIA,

CHICAGO, ST. LOUIS,

SAN FRANCISCO.

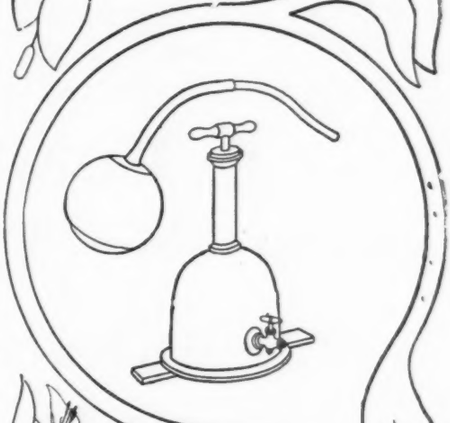
PUBLIC LIGHTING TABLE.

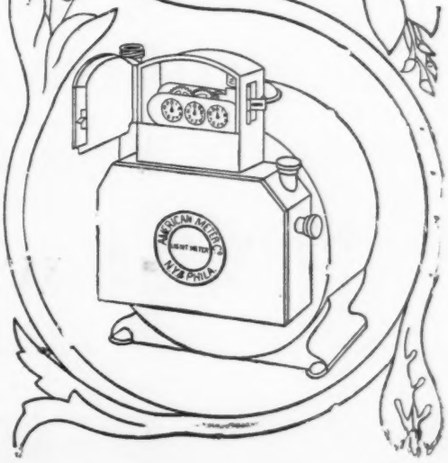
SEPTEMBER, 1897.

DAY OF WEEK.	DATE.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Wed.	1	7.40 PM	4.30 AM	6.30	4.20
Thu.	2	8.20	4.30	6.30	4.20
Fri.	3	9 10 FQ	4.30	6.15	4.30
Sat.	4	10.20	4.30	6.15	4.30
Sun.	5	11.20	4 30	6.15	4.30
Mon.	6	12.40 AM	4.30	6.15	4.30
Tue.	7	1.50	4.30	6.15	4.30
Wed.	8	3.00	4.30	6.15	4.30
Thu.	9	No L.	No L.	6.15	4.30
Fri.	10	No L. FM	No L.	6.05	4.40
Sat.	11	No L.	No L.	6.05	4.40
Sun.	12	6.40 PM	7.40 PM	6.05	4.40
Mon.	13	6.40	8.00	6.05	4.40
Tue.	14	6.40	8.30	6.05	4.40
Wed.	15	6.40	9.00	6.05	4.40
Thu.	16	6.40	9.40	6.05	4.40
Fri.	17	6.40	10.20	5.55	4.50
Sat.	18	6.40 LQ	11.10	5.55	4.50
Sun.	19	6.30	12.10 AM	5.55	4 50
Mon.	20	6.30	1.10	5.55	4.50
Tue.	21	6.30	2.20	5.55	4.50
Wed.	22	6.30	3.20	5.55	4.50
Thu.	23	6.30	4.50	5.55	4.50
Fri.	24	6.30	4.50	5.40	5.00
Sat.	25	6.30	4.50	5.40	5.00
Sun.	26	6.20 NM	5.00	5.40	5.00
Mon.	27	6.20	5.00	5.40	5.00
Tue.	28	6.20	5.00	5.40	5.00
Wed.	29	6.20	5.00	5.40	5.00
Thu.	30	6.20	5.00	5.40	5.00

TOTAL HOURS LIGHTING DURING 1897.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	233.00	January	423.20
February	187.20	February	355 25
March	202.00	March	355.35
April	170.40	April	298.50
May	163.00	May	264.50
June	140.40	June	234.25
July	151 40	July	243.45
August	167.30	August	280.25
September	174.40	September	321.15
October	200.00	October	374.30
November	205.20	November	401.40
December	220.10	December	433.45
Total, yr.	2216.00	Total, yr.	3987.45





To Whom It May Concern.

WE have learned that the makers of the "Sunlight" lamp assert that there has been a decision in the English Courts which saves them and their customers from liability as infringers of the Welsbach patents.

We assure the public there is no decision of any Court, in England or elsewhere, that directly or indirectly warrants the statement or inference that the lamp sold by the Sunlight Incandescent Gas Lamp Company of America is not an infringement of the Welsbach Light as made under the American patents, of which the Welsbach Light Company is sole and exclusive owner.

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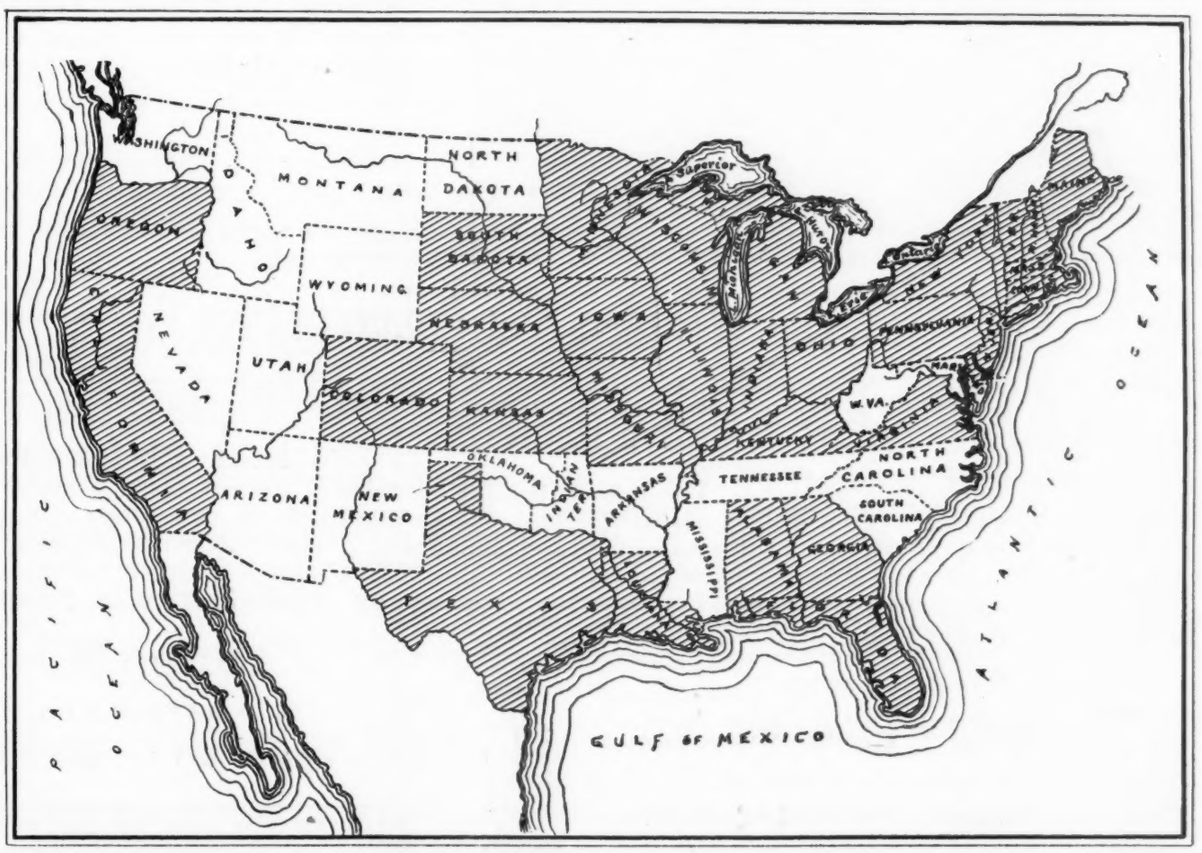

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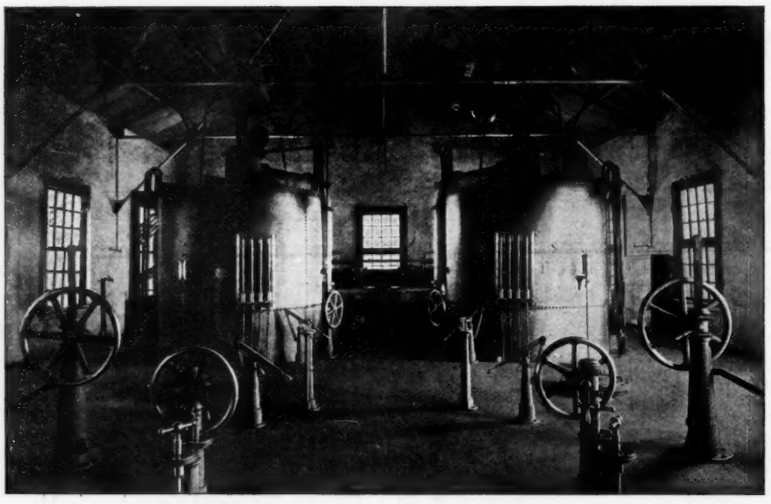

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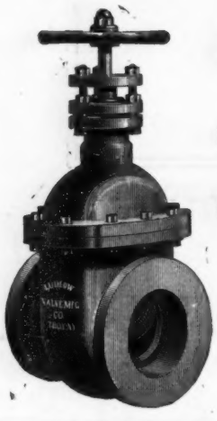

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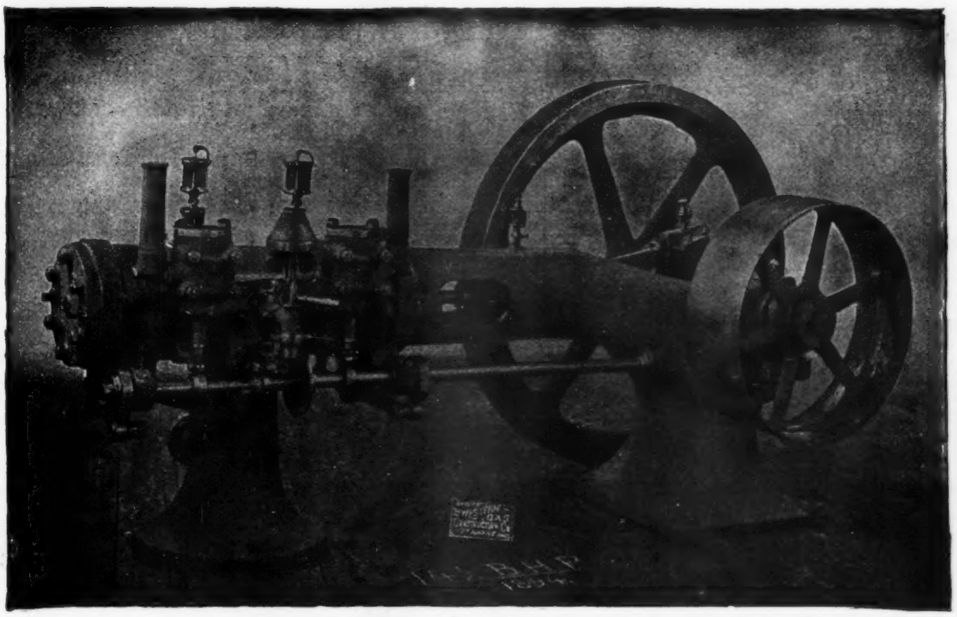

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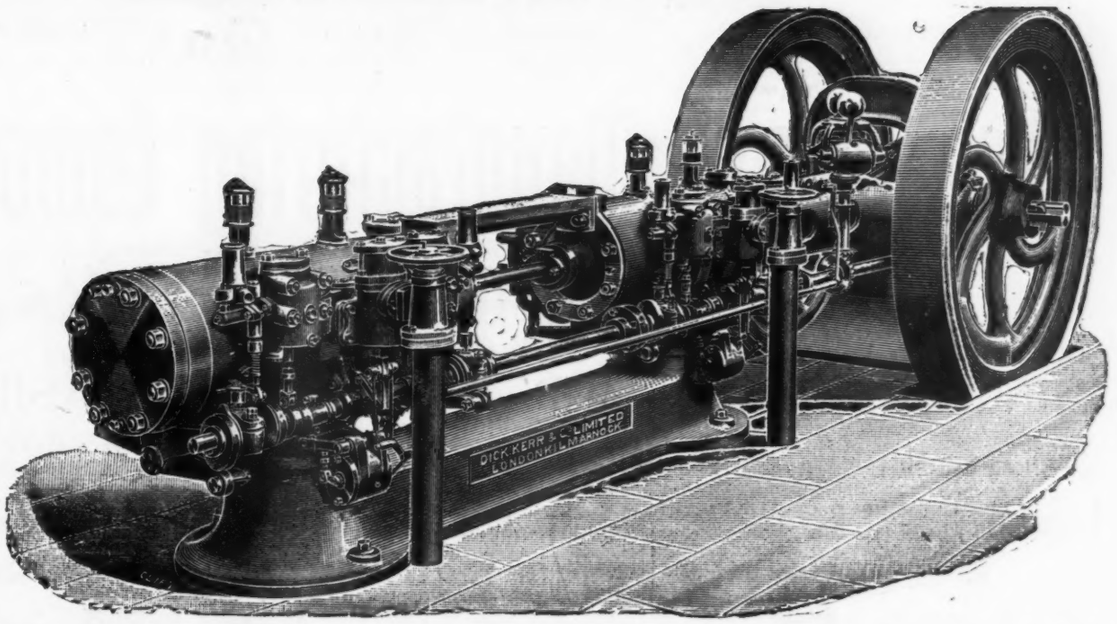

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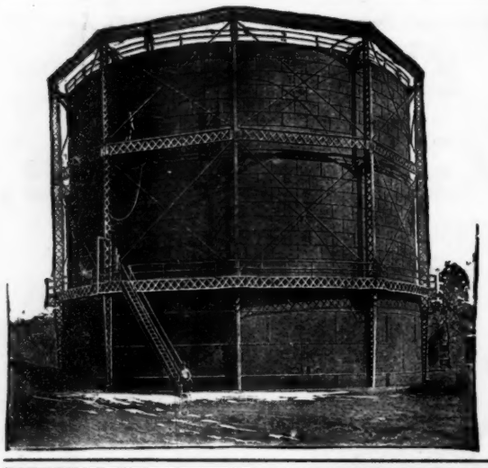

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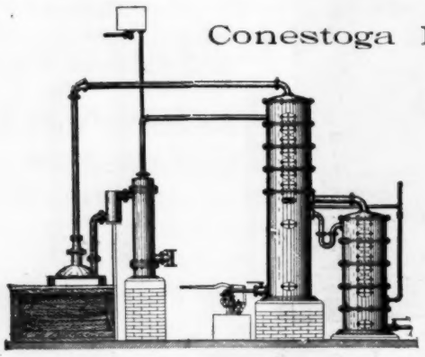

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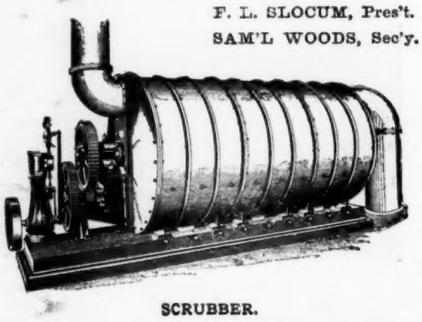

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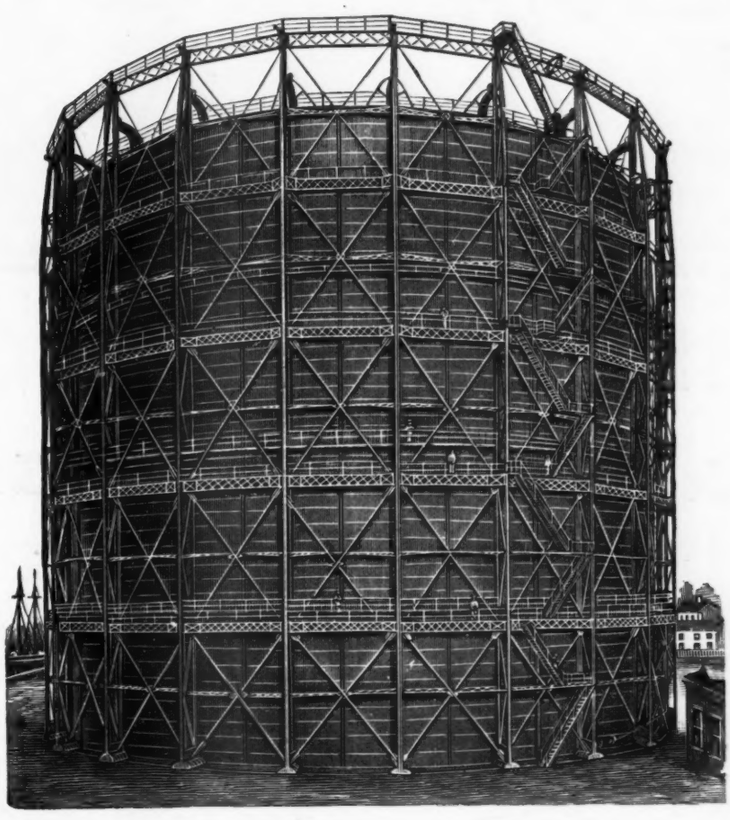

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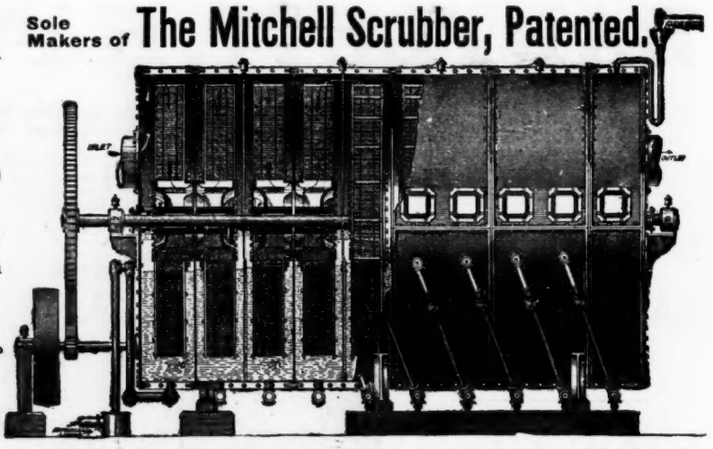

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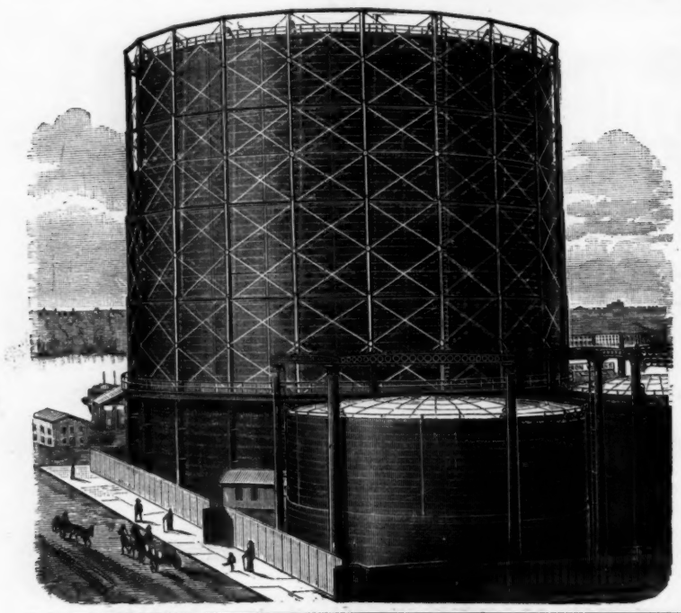

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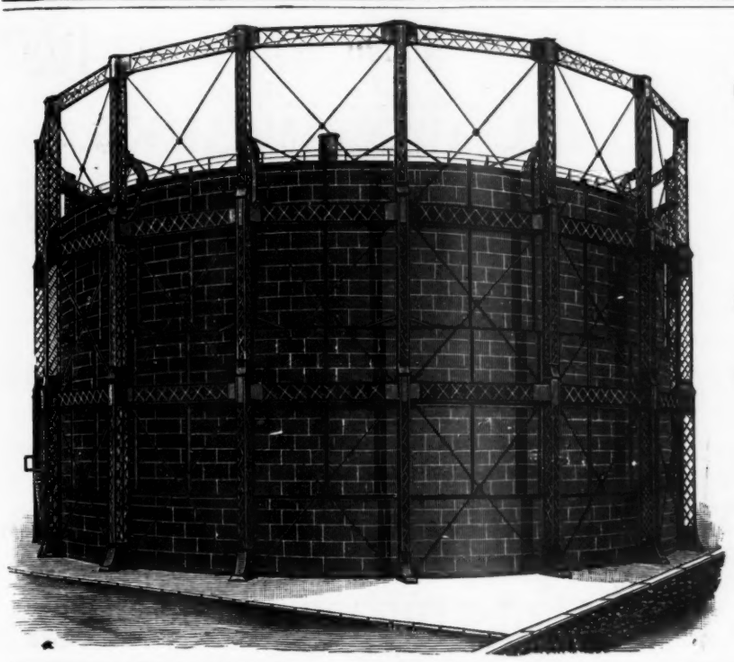

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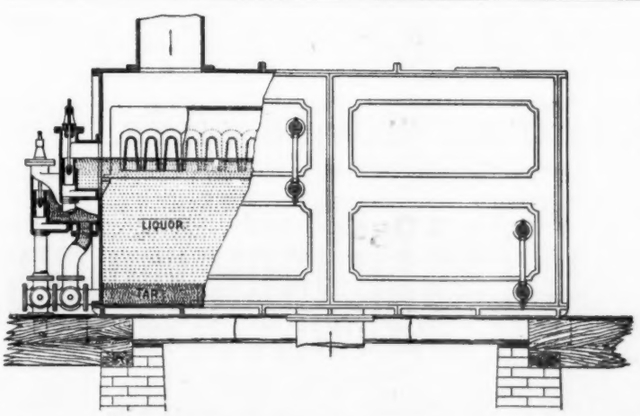

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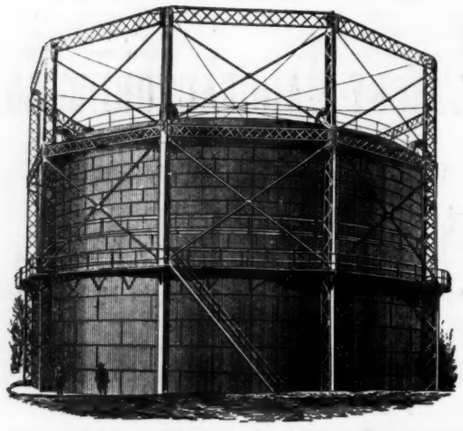

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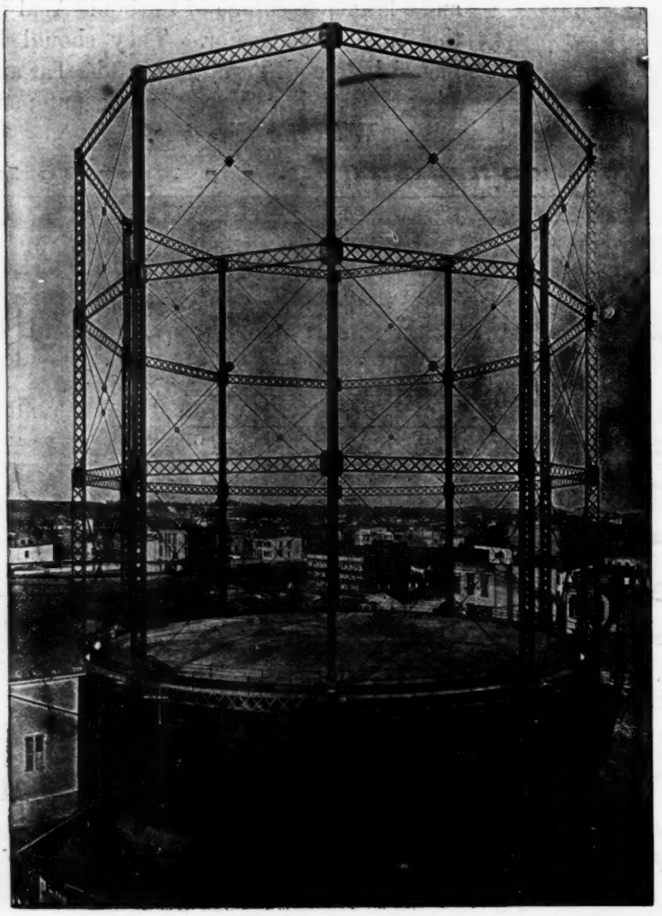

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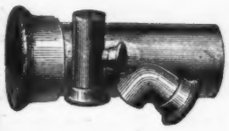

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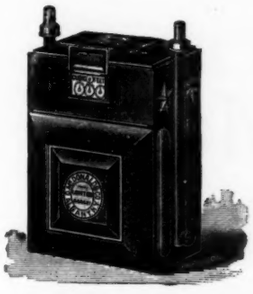

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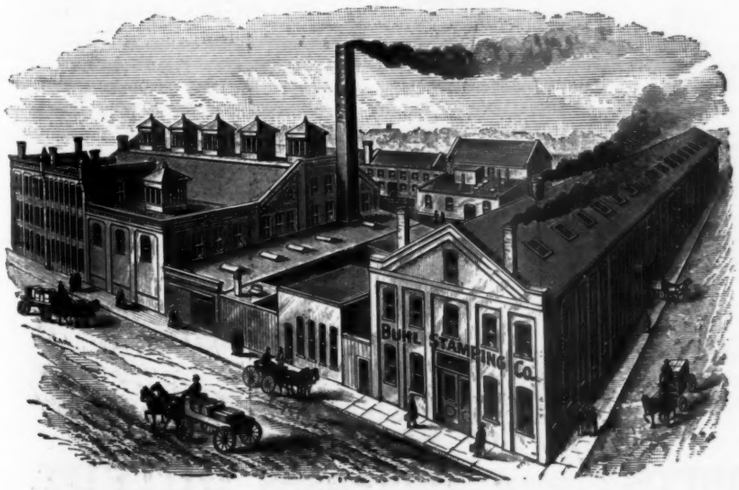

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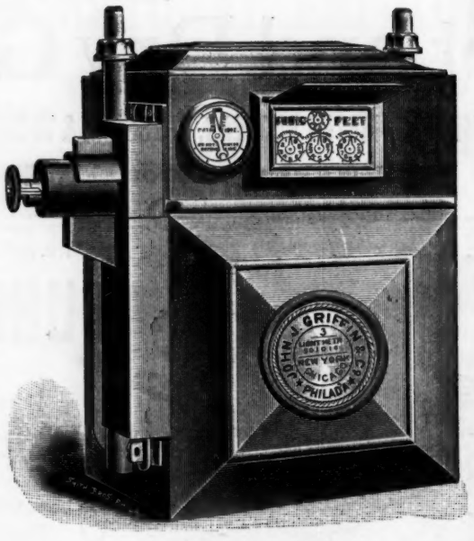

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